MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The general weather conditions which prevailed over the United States and Canada during August, 1883, are presented in this REVIEW, based upon reports received from the regular stations of the Signal Service, from the Canadian Meteorological Service, and from co-operating state weather services, and voluntary observers.

The more prominent meteorological features of the month have been:

1st.—The low mean temperatures which have prevailed over nearly the whole country, being most marked in the Missouri and upper Mississippi valleys.

2d.—The small monthly precipitation, which has been below the average in all parts of the country, except in the extreme northwest and in the northern and middle slopes; the districts of greatest deficiency being the Gulf States, Ohio and upper Mississippi valleys, and the upper lake region.

The most violent and destructive local storms of the month occurred in Iowa, during the night of the 7–8th, and in Minnesota, on the 21st, the latter causing the destruction of a large part of the town of Rochester, Minnesota, and the loss of about thirty lives.

Respecting the weather over the north Atlantic ocean, the month has been marked by a succession of storms, two of which (numbers vi. and viii. on chart ii.) were apparently tropical hurricanes. These were disastrous in their effects, especially near the banks of Newfoundland and along the coast of the United States. Many lives were lost and great damage done to shipping. The approximate paths of the centres of these storms are shown on chart ii.

Referring to the ice region of the north Atlantic, the diminution of reports indicate that icebergs are rapidly disappearing.

Under "notes and extracts" will be found an interesting report upon the climate of Palestine, by Mr. Selah Merrill, United States consul at Jerusalem.

In the preparation of this REVIEW, the following data, received up to September 20th, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-two Signal Service stations and fifteen Canadian stations, as telegraphed to this office; one hundred and fifty-one monthly journals, and one hundred and thirty-five monthly means from the former, and fifteen monthly means from the latter; two hundred and thirty-eight monthly registers from voluntary observers; fifty-seven monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the local weather services of Indiana, Iowa, New Jersey, Ohio, and Tennessee, and of the Central Pacific railway company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[*Expressed in inches and hundredths.*]

The distribution of mean atmospheric pressure for the month of August, 1883, determined from the tri-daily telegraphic observations of the Signal Service, is shown by the isobarometric lines on chart iii. This chart exhibits three areas of barometric maxima, two of which are situated east of the Rocky mountains and are inclosed by the isobars of 30.05, and the third area occupies the north Pacific coast, where, at Portland, Oregon, the mean atmospheric pressure for the month was 30.1. Of the areas of barometric maxima east of the Rocky mountains, the larger extends from northern Ohio and Pennsylvania southward to central Georgia, and the smaller area covers Illinois and the lower Missouri valley. The highest barometric means reported from stations east of the Rocky mountains are: 30.07 at Cincinnati, Ohio; Knoxville, Tennessee; Saint Louis, Missouri, and Washington, District of Columbia; and 30.09 at Cairo, Illinois. An area of barometric minima covers the southern and central plateau regions as shown by the broken isobars of 29.85 and 29.9. Owing to the limited number of reports received from these districts, the isobars are broken to indicate doubt, but the reports at hand show the region of least pressure to cover Arizona, where monthly means of 29.81 and 29.84 occurred at Yuma and Fort Apache, respectively.

Compared with the mean pressure for July, there has been an increase in all districts except in Tennessee and the south Atlantic and Gulf States. In the Canadian maritime provinces, the Rocky mountain region, and on the Pacific coast, the excess varies from .01 to .05; it is greatest in the upper lake region, where it amounts to .10. The line of no change extends from the central part of southern Texas northeastward to the Atlantic coast near the southern boundary of Virginia. The deficiencies in the south Atlantic and Gulf states and in Tennessee vary from .01 to .07, and are greatest along the immediate Gulf coast and in Florida.

DEPARTURES FROM THE NORMAL VALUES FOR THE MONTH.

In New England and southward along the Atlantic coast to Georgia, the mean pressure has been slightly below the normal, the deficiencies varying from .01 to .03. From these districts westward to the Pacific coast, the mean pressure has been above the normal, except over the northern part of the upper lake region, where it has not differed from the normal. The increase over the normal has not exceeded .08, and has been greatest in the upper Mississippi and Missouri valleys, the northern slope, and north Pacific coast region.

BAROMETRIC RANGES.

The monthly barometric ranges have been greatest in the extreme northwest, and in the upper lake region; they have been smallest in southern California, and at stations on the coast of the Gulf of Mexico. The extremes for the month are: greatest, 1.09 at Saint Vincent, Minnesota; smallest, 0.19 at Los Angeles, California.

The monthly ranges have varied in the different districts as follows:

New England.—From 0.57 on the summit of Mount Washington, New Hampshire, to 0.67 at Portland, Maine.

Middle Atlantic states.—From 0.45 at Cape Henry and Norfolk, Virginia, to 0.66 at New York City.

South Atlantic states.—From 0.33 at Atlanta, Georgia, to 0.40 at Hatteras, North Carolina.

Florida peninsula.—From 0.27 at Key West, to 0.37 at Sanford.

Eastern Gulf.—From 0.29 at Vicksburg, Mississippi, to 0.33 at Mobile and Montgomery, Alabama, and Pensacola, Florida.

Western Gulf.—From 0.29 at Palestine, Texas, to 0.36 at Little Rock, Arkansas.

Tennessee.—From 0.30 at Chattanooga to 0.34 at Memphis.

Ohio valley.—From 0.39 at Louisville, Kentucky, to 0.42 at Indianapolis, Indiana, and Columbus, Ohio.

Lower lakes.—From 0.47 at Sandusky, Ohio, to 0.63 at Oswego, New York.

Upper lakes.—From 0.53 at Chicago, Illinois, to 0.90 at Marquette, Michigan.

Extreme northwest.—From 0.60 at Fort Buford, Dakota, to 1.09 at Saint Vincent, Minnesota.

Upper Mississippi valley.—From 0.34 at Cairo, Illinois, to 0.85 at Saint Paul, Minnesota.

Missouri valley.—From 0.54 at Leavenworth, Kansas, to 0.74 at Yankton, Dakota.

Northern slope.—From 0.41 at Cheyenne, Wyoming, to 0.57 at Fort Custer, Montana.

Middle slope.—From 0.25 on the summit of Pike's Peak, Colorado, to 0.47 at West Las Animas, Colorado.

Southern slope.—From 0.30 at Coleman city, Texas, to 0.34 at Fort Concho, Texas.

Southern plateau.—From 0.19 at Fort Apache, Arizona, to 0.37 at El Paso, Texas.

Northern plateau.—From 0.46 at Dayton, Washington Territory, to 0.49 at Spokane Falls, Washington Territory.

North Pacific coast.—From 0.41 at Roseburg, Oregon, to 0.51 at Portland, Oregon.

Middle Pacific coast.—From 0.32 at Cape Mendocino and San Francisco, California, to 0.37 at Red Bluff, California.

South Pacific coast.—From 0.19 at Los Angeles, California, to 0.33 at Yuma, Arizona.

AREAS OF HIGH BAROMETER.

Although the areas of high barometer during the month have been of considerable extent, the pressure has not been very marked. Only three areas are of sufficient importance to merit description. These were accompanied by areas of low barometer.

I.—This area made its appearance in the extreme northwest on the afternoon of the 1st. On the morning of the 2d it extended over the northern portions of the upper lake region, Mississippi and Missouri valleys. On the 3d it embraced Tennessee and the Ohio valley, the lake region, the Mississippi and Missouri valleys. The general direction of the movement was southeasterly and it passed off into the Atlantic on the 8th. Cool weather prevailed in all districts during its progress, the temperature falling 10° to 20°.

II.—The morning report of the 12th showed the barometer to be above the normal in the extreme northwest, and on the 13th the pressure increased to from .2 to .3 of an inch above the normal, the centre being in Minnesota. On the morning of the 14th the centre was over Lake Huron, and the area extended over all districts east of the Mississippi valley. The area moved in an easterly direction, the centre passing over New England and Nova Scotia, and disappeared on the 16th. Light frosts occurred in the upper lake region, Canada, and northern portions of the New England states during its progress.

III.—This area first made its appearance east of British Columbia. The morning report of the 25th showed it had moved easterly and was central near Manitoba. On the 26th the greatest pressure was over Lake Superior, and on the 27th it had moved to the Saint Lawrence valley, and passed off into the Gulf of Saint Lawrence on the 29th.

AREAS OF LOW BAROMETER.

Seven areas of low barometer have been traced during the month, and the tracks of the centres are shown on chart number i. In but one instance has an area of low barometer appeared in the Southern states, that described as number iii. The majority of these areas moved in a direction north of east, the two exceptions being numbers vi. and vii. Numbers v. and vi. were the most violent during the month.

The following table shows the latitudes and longitudes in which each depression was first and last observed, and the average hourly velocity of each depression:

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
	° ′	° ′	° ′	° ′	
No. I.	47 30	87 00	49 00	65 30	11.2
II.	44 30	92 00	48 00	63 00	27.7
III.	34 15	90 00	37 15	76 15	35.8
IV.	50 15	107 15	50 00	78 00	27.8
V.	45 15	97 00	51 30	63 45	36.5
VI.	48 00	97 00	34 30	75 00	29.0
VII.	52 00	107 15	.....	.....	.....
Mean hourly	velocity				28.0

I.—The afternoon report of the 1st showed the barometer at Marquette, Michigan, to be .25 below the normal. Light rain had fallen during the previous eight hours in the northern portion of the upper lake region. On the morning of the 2d the centre of area was near Rockliffe, Canada, and the rain area extended over the lake region, Tennessee and the Ohio valley, and the middle Atlantic states. On the 3d the centre was north of Montreal; from thence it followed the course of the Saint Lawrence river, increasing somewhat in energy, and passed beyond the limits of observation on the 4th. Its passage over the country was not marked by any high winds on the lakes, but on the Atlantic coast the winds reached a velocity ranging from twenty-five to fifty-five miles an hour. The lowest barometer observed was 29.48 at Anticosti, Gulf of Saint Lawrence, on the 4th.

II.—An area of low pressure appeared in Colorado and Utah on the 9th, and remained stationary on the 10th. The morning report of the 11th showed a small trough extending in a northeasterly direction from Colorado to the upper Mississippi valley; the greatest depression, however, remaining central in Colorado. During the 11th the high area described as number ii. moved rapidly over the Missouri valley, dividing the low area into two parts, leaving a weak depression central in the upper Mississippi valley, while the greater depression remained stationary in Colorado, but gradually disappeared during the following day. At the afternoon report of the 11th the depression in the Upper Mississippi valley was central near Saint Paul, Minnesota; from thence it moved slowly eastward, accompanied by light rains, and on the morning of the 12th it was central over Lake Michigan. Its progress there became more rapid, and on the 13th the centre was at Quebec, having altered its course from an easterly to a northeasterly direction, and finally disappeared on the 14th. No high winds marked its passage, except on the New Jersey coast, where they reached a velocity of thirty-four miles. The lowest barometer was 29.69 at Bird Rock, Gulf of Saint Lawrence, on the 14th.

III.—This depression developed in the Northern portion of the state of Mississippi during the afternoon of the 15th, preceded by light rains. It moved rapidly in a northeasterly direction, and on the morning of the 16th it was central near Lynchburg, Virginia, and passed into the Atlantic during the day, increasing in energy as it approached the coast. It was accompanied by very heavy rains, especially on the coast, the precipitation at Kittyhawk being over eight inches in twenty-four hours. High northeasterly winds prevailed on the Atlantic coast during its progress.

IV.—This area cannot be traced further than the Saskatchewan valley, where it made its appearance in the afternoon of the 16th. The centre was east of Manitoba on the morning of

the 17th; on the 18th it was north of Lake Superior; from this point it changed its course to a more northeasterly direction, and the location of centre could not to be determined after the midnight report of the 18th. At no time was the centre within the limits of stations of observations. Light rains fell in the Missouri and Mississippi valleys, the lake region, and New England.

V.—On the 18th the barometer was considerably below the normal at the stations in the British territory north of Montana, and the direction of the wind showed that the centre of area was to the north of these stations, but could not be definitely located until the 19th, on which date it was north of Fort Garry, Manitoba. The barometer was quite low at Fort Garry, reading 29.09. This area cannot be traced farther, but as it passed off it left a secondary depression in the Missouri valley on the 21st. The area thus formed moved in a northeasterly direction, and on the morning of the 22d it was central over Lake Superior. Violent gales with rain marked its passage over the upper lakes. It continued in a northeasterly course and passed beyond the limits of observation on the 23d.

VI.—This area made its appearance on the morning of the 29th, in the extreme northwest, moving in a southeasterly direction, accompanied by rain. On the 27th it was central in Minnesota, on the 28th in Indiana, on the 29th in Virginia, and on the latter date passed into the Atlantic off the North Carolina coast, and undoubtedly united with the hurricane described as number viii. under "north Atlantic storms" which was raging on that date and was so disastrous to vessels in the Atlantic ocean, and in the vicinity of Newfoundland. Rain fell in nearly all the districts east of the Missouri valley, and high northeasterly winds prevailed on the Atlantic coast during the progress of the storm.

VII.—The reports from the Saskatchewan valley, on the afternoon of the 30th, showed the presence of an area of low barometer in that region. On the morning of the 31st the centre was north of Dakota. The area moved in a southeasterly direction, and at midnight of the 31st it was central in southern Minnesota. This storm increased considerably in energy after the midnight report of the 31st, and became quite violent upon reaching the lake region. Its further description will be found in the REVIEW for September.

NORTH ATLANTIC STORMS DURING AUGUST, 1883.

[*Pressure expressed in inches and in millimetres; wind-force by scale of* 0—10.]

Chart ii. exhibits the tracks of the principal depressions that have moved over the north Atlantic ocean during August, 1883. The location of the various storm-centres has been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels in the north Atlantic, and from other miscellaneous data received at this office up to September 21st. The observations used, are, in general, simultaneous, being taken each day at 7 h. 0 m. Washington, or 0 h. 8 m. p. m. Greenwich, mean time.

Of the eight depressions charted, five are traced from W. 65° northeastward to beyond the fifteenth meridian, and three, numbers i., ii., and iii., apparently developed to the eastward of W. 35°. Of the former, number vi. was a tropical hurricane which moved northwestward at a considerable distance from the coasts of the United States, and recurved probably near W. 67°, and in the latitude of the Bermudas. So far as can be determined from the data now at hand, low area viii. appears to have developed over the ocean between the Bermudas and the United States, and to have moved northward to about the forty-second parallel, when the course changed to the northeastward, and the disturbance swept over the banks of Newfoundland as a severe storm; it appears to have increased in energy as it moved over the ocean, and was probably identical with the violent storm encountered during September 1st and 2d, by vessels off the coasts of the British Isles. The two depressions above referred to displayed unusual violence throughout the entire period for which they are charted, and caused great loss of life, and immense damage to shipping. As a peculiar feature of the hurricane charted as viii, may be mentioned the unusually high latitude to which it ascended before recurving to the eastward.

The weather over the North Atlantic during the month was in general stormy, and may be summarized as follows: 1st to 11th, moderate to strong breezes, generally southwest to west, occasional fogs; 12th to 18th, generally strong variable breezes increasing to strong gales, squally, rainy weather; 18th to 31st, strong breezes to heavy gales, cloudy or rainy weather, occasional fogs.

The following descriptions relate to the depressions charted:

I.—This depression first appeared on the 7th, between N. 45° and 55° and W. 25° and 35°. On that date the s. s. "Wisconsin" in N. 51° 2′, W. 26° 45′, reported barometer 29.59 (751.6), a fall of .45 inch during the preceding forty-eight hours; wind s. by w., force 5. Moving eastward during the day, the depression appeared off the western coast of Ireland, where it probably became merged in low area ii.

II.—This was a deep depression which appeared off the coast of northern Scotland on the 8th; the lowest barometric reading, 29.17 (740.9), was observed by the bark "Ottawa" in N. 59° 31′, W. 11° 13′, wind nne., force 4, cloudy. It probably moved over Scotland to the North sea.

III.—This depression was first noticed in about N. 48°, W. 30°, on the 11th, the centre of disturbance lying to the southward of the s. s. "Illinois," which reported, in N. 48° 09′, W. 32° 05′, barometer 29.64 (752.8); wind ne., strong breeze increasing to strong gale; barometer falling slowly. During the 11th the disturbance moved slowly northeastward, and on the 12th the centre passed close to the s. s. "Illinois." At 2 a. m. the wind backed to n., with very heavy rain and high sea; and at 6 a. m., in N. 49° 15′, W. 26° 45′, the barometer read 28.85 (732.8); wind hauling to wnw. and becoming light. The s. s. "Llandaff City," on the 11th had e. wind with heavy rain; at 1.32 a. m., of the 12th, in N. 50° 32′, W. 23° 12′, e. wind, force 6, fine weather, barometer 29.63 (752.6); at 7 a. m., (Greenwich mean time,) barometer 28.48 (748.8), wind nne., force 8; at 1.44 p. m., (Greenwich mean time,) in N. 50° 16′, W. 25° 57′, wind n., force 9, barometer 29.63 (752.6), rising. On the 13th the depression was central near N. 51°, W. 20°; the s. s. "Daniel Steinmann," in about N. 51° 04′, W. 19° 48′, reported, 9 a. m., wind se., force 4, shifting, during a heavy rain squall at 0.30 p. m., to nw. and w. and increasing to force 9; at 7 p. m. barometer 28.32 (744.7); at midnight the squalls became less violent and wind moderated to force 3. The s. s. "Strassburg," in N. 50° 15′, W. 18° 33′, reported barometer 29.05 (737.9), wind ssw., force 6–7, light rain, squally. By the morning of the 14th the depression was off the northwestern coast of Ireland.

IV.—This is a continuation of the disturbance charted as low area ii., on chart i. of this REVIEW. On the 13th the depression occupied the Gulf of Saint Lawrence and the Maritime Provinces; it moved by a course slightly north of east to about N. 49°, W. 48°; where it was central on the 14th, causing moderate s. and sw. gales to the eastward as far as W. 40°, while moderate to stronge nw. breezes prevailed to the westward of the fiftieth meridian. Moving northeastward during the 14th, the disturbance was shown near N. 54°, W. 34°, where the pressure ranged from 29.45 (748.0) to 29.6 (751.8). Moderate to strong sw. and w. gales were reported by vessels near the fiftieth parallel, and between W. 35° and W. 25°. On the 16th the storm-centre was moving slowly northeastward north of the fifty-fifth parallel; the sw. winds above referred to had now changed to nw., but showed no diminution in force, while sw. winds prevailed from W. 27° eastward to the British Isles. By the 17th the disturbance had passed to the northwest of the British Isles.

V.—This was probably a continuation of the disturbance charted as low-area iii., on chart i. On the morning of the 17th the depression was shown to the eastward of Nova Scotia, accompanied by rain and moderate to strong breezes. On the 18th the disturbance reached N. 49°, W. 45°; the reports indicate that it increased in energy as it moved eastward, the

lowest reported pressure being 29.5 (749.3); the s. s. "Daniel Steinmann," in N. 48° 37′, W. 41° 00′, had a strong ssw. gale of force 9, accompanied by heavy rain; at 11 a. m. the wind, after veering to se., suddenly shifted to wsw., barometer 29.5 (749.3); at 5 p. m. the wind was n. by w., force 10; at 10 p. m., wind nw., gradually decreasing in force. During the day the depression moved quickly northeastward, and on the 19th it was apparently near N. 54°, W. 28°, the pressure having further decreased; the s. s. "Scandinavian," in N. 54° 33′, W. 25° 30′, reported as follows: 19th, barometer remained steady until 5.18 a. m., (Greenwich mean time,) when it began to fall rapidly, wind veering to ese.; 0.20 a. m., one vivid flash of lightning, with thunder and heavy rain, wind ese., force 8 to 9; 12.08 p. m., in N. 54° 44′, W. 25° 33′, barometer 29.21 (741.9), wind moderating and hauling to westward, force 6; midnight, gale moderating, sea going down. The s. s. "Grecian," (near above position,) reported sse. wind of force 8, barometer 29.83 (757.7), falling; 4 p. m., (Greenwich mean time,) calm, barometer still falling, high sea-swell; 7.20 p. m., (Greenwich mean time,) barometer 28.97 (735.8), light w. wind, high sw. swell; at 2 a. m., of the 20th, the wind shifted to wnw. in a strong gale, barometer rising. On the 20th the disturbance was transferred to about N. 58°, W. 13°, and disappeared beyond the field of observation, the pressure having greatly increased.

VI.—This was a tropical hurricane, which developed south of the twentieth parallel prior to the 19th. The storm-centre moved to the northwestward and recurved to the northeastward, when north and west of the Bermudas, on the 23d or 24th. It evidently passed at a considerable distance from the coasts of the United States, since the only indication of a hurricane noticed by vessels on the seventy-second meridian, was the unusually heavy se. swell which prevailed for several days. In this connection, Captain Timmerman, of the s. s. "City of Alexandria," reports that the se. swell of the 21st, (in N. 34°, W. 74°,) was the heaviest he ever experienced during calm weather. Captain Hess, of the s. s. "Valencia," also reported in N. 30° 11′, W. 71° 22′, barometer 30.16 (766.1), wind n., force 6, very heavy se. swell, unsettled weather, heavy bank of clouds in the se. The earliest observations indicating the presence of the hurricane are those of the bark "B. F. Watson." On the 19th, in about N. 21° 28′, W 58° 30′, that vessel reported threatening weather, barometer falling gradually, wind nne. blowing in strong gusts, and accompanied by heavy rain; 10 a. m., shortened sail and hove to, wind nnw. blowing a gale with heavy rain, barometer 29.73 (755.1); 1 p. m., barometer 29.7 (754.4), wind wnw; 2 p. m., barometer 29.65 (753.1), wind blowing in terrific gusts, and high confused sea running; 4 p. m., barometer 29.68 (753.0), wind moderating and barometer rising, weather clearing. It would thus appear that, on the 18th, the storm-vortex was at a considerable distance to the eastward of the vessel and moving towards the northwest. The next report is that of the U. S. Steamer "Galena," Commander Batcheller, United States Navy, commanding. On the 20th that vessel was in N. 24° 40′, W. 61° 26′, and reported as under:

Hour.	Barometer (corrected.)		Wind.		Remarks.
	Inches.	Mill.	Direc'n.	Force.	
19th.					
1 a. m.....	29.95	760.7	ne.	6-7	Barometer falling slowly.
10 a. m.....	29.83	757.7	ne.	10	Sea becoming heavy.
11 a. m.....	29.83	757.7	ene.	10	
1 p. m.....	29.75	755.6	e. by n.	10	Squalls very heavy and sea rough.
2 p. m.....	29.57	751.1	e. by s.	10	Wind hauling gradually to south but sometimes backing again for half an hour.
5 p. m.....	29.47	748.3	se. ½ e.	10	Strong cyclone blowing; wind hauling slowly to south.
6 p. m.....	29.47	748.3	se.	10	Frequent lulls followed by heavy gusts; heavy, irregular sea.
9 p. m.....	29.63	752.6	sse.	10	Barometer rising.
11 p. m.....	29.72	754.9	s. by e.	10	Wind hauling to south and moderating slightly.
20th.					
3 a. m.....	29.79	756.7	s.	9	Moderating.
5 a. m.....	29.87	758.7	sse.	8	Very heavy squall of wind and rain from south-southeast from 4 to 5.30 a. m.
6 a. m.....	29.91	759.7	sse.	7	Wind and sea moderating.

This report shows the storm-centre to have been southeast of the ship, and moving toward the west; during the 18th and 19th the storm vortex was therefore between N. 18°, W. 58°, and N. 26°, W. 63°, and moving in a northwesterly direction between the "B. F. Watson" and the "Galena." The following reports serve to indicate the probable course of the storm and its violence: s. s. "Flamborough," in N. 24°, W. 66°, on the the 19th, experienced heavy gales and lost spars and deck fittings; on the 20th the bark "Folkefesten," in N. 28° 10′, W. 65° 41′, had a heavy ne. gale veering to s. and w. and lasting two days; vessel lost several sails. The brig "Abbie Clifford," in N. 29° 40′, W. 69° 30′, reported barometer (aneroid,) 30.12 (765.0), wind ne., force 6, long heavy se. swell; upper clouds moving slowly from s. and lower from ne. On the 21st the brig "Helen O. Phinney," in N. 27°, W. 66°, took a hurricane from s. to wnw., lost foremast and all attached. On the 22d the brig "Clara Jenkins" was dismasted in a hurricane in N. 33°, W. 67, and on the same date the brig "Daphne," near N. 32°, W. 70°, reported as follows: 4 p. m., (Greenwich mean time,) took a hurricane which lasted with great violence until the 24th; the wind was at first e., then ne., and kept gradually backing until it finally settled in the sw.; the barometer fell to 29.7 (754.4). The wind blew hard throughout the forty-eight hours, but during the passing rain squalls it was terrific; the sea was very high and irregular. On the 23d the bark "Emilia T.," in N. 34° W. 68°, encountered a hurricane from se. by e., veering to nw. and lasting twenty-four hours, lost sails.

This report seems to indicate that the hurricane recurved somewhere near the position given by the "Emilia T." On the 25th, the s. s. "Britannia," in N. 38° 15′, W. 63° 10′, reported having encountered a cyclone from sw. which suddenly flew around to ne. and then to se., with very heavy sea, vessel shipped large quantities of water; damaged boats and lost sails. The s. s. "Republic" reported, 4.21 p. m., Greenwich mean time, N. 41° 39′, W. 60° 29′; at 8.2 p. m. barometer 29.79 (756.7), wind s., force 4, heavy squalls of wind and rain, wind veering to se. in the squalls; midnight, barometer 29.68 (753.9), wind ese., force 8, moderate gale, with fierce squalls; 14h. 2m., barometer 29.48 (748.8), wind shifted to ene., and increased, squalls more frequent; 16h. 2m., barometer 29.22 (742.2), wind veering to northward and blowing with hurricane force, with heavy confused sea; 18h. 2m., gale at its height, fierce squalls, barometer beginning to rise; 20h. 2m., barometer 29.44 (747.8), wind n., force 10, heavy confused sea; 24h. 0., barometer 29.53 (750.0), weather moderating, wind veering to nw. Ship's position on the 26th, N. 42° 32′, W. 55° 0′.

From the 20th to 25th the storm-vortex seems to have moved very slowly, but after turning to the northeastward the movement became more rapid; the pressure decreased, and the wind and sea became, if possible, more violent. On the 26th the storm centre was probably on the southern edge of the banks of Newfoundland. The bark "Lynwood," in N. 43° 18′, W. 54° 31′, reported, 3 p. m., 25th, wind s., with rain, barometer falling rapidly, hove ship to, on the starboard tack; 5 a. m., 26th, wind died out, and at 6.20 a. m. a hurricane burst out from ne. throwing the ship nearly on her beam ends; parted topsail sheets, lost lower topsails and blew the sails out of the gaskets; lost eleven sails; the hurricane lasted ten hours, with terrible fury and fearfully high sea.

It was this gale that wrought such damage to the fishing vessels on the Banks; the gale began suddenly at sunrise on the 26th, the wind blowing violently from the e. and shifting to nne. with high sea. It is reported that one hundred dories and eighty men were lost; this great loss of life was due to the fact that many dories were away from their vessels, overhauling nets when the gale burst on them, and were unable to regain their ships. Many fishing vessels ran before the gale and reached port in a disabled condition, others were swamped by the heavy seas and their crews washed overboard. The lowest reliable barometric observations on the 26th, in connection with this storm, as yet in the possession of this office,

are those of the steamships "State of Nevada," and "Pennsylvania." The former, in N. 45° 43′, W. 49° 15′, reported barometer 28.9 (734.0), wind ese., force 9; at about 9 a. m., (Greenwich mean time), it began to blow strongly from the s. and veered to ese., increasing to a whole gale with very high sea; at noon the wind suddenly shifted to nw. and continued until 2 p. m., blowing very hard. The s. s. "Pennsylvania," in 45° 28′, W. 50° 00′, reported barometer 28.98 (736.1), wind nne., force 10, thick and sultry.

All vessels between the fortieth and fiftieth meridians and south of N. 47° reported strong gales from s., ne., and nw. The s. s. "Finchley," in N. 47° 20′, W. 47° 40′, reported strong ne. gale, veering to n. and nw., barometer, not corrected, 28.8 (731.5). Moving northeastward during the 26th, the storm-centre reached N. 51°, W. 36°, on the 27th, the barometer having risen to 29.41 (747.0), as reported by the s. s. "British Princess," in about N. 49° 20′, W. 37° 20′. From 10.30 a. m. to 2.30 p. m., (Greenwich mean time,) of the 27th, that vessel experienced a heavy gale from wsw., w., and nw. The s. s. "Habsburg" reported: 27th, 2. 40 a. m., barometer 29.59 (751.6), wind sse., force 7; 3.40 a. m., in N. 48° 20′, W. 40° 00′, barometer 29.45 (748.0), wind se., force 8; 4.40 a. m., wind s., force 10; 5.40 a. m., wind sw., force 10; 6.40 a. m., wsw., force 9, sea very heavy and irregular. From 6.40 a. m. till 10.40 a. m., wind wsw., force 8, barometer rising; at 10 a. m., wind changed to wnw.; from 10 a. m. to noon, wind decreasing and barometer rising. By the 28th the depression had moved northeastward to about N. 56°, W. 21°, the region of least pressure being indicated by the isobar for 29.5 (749.3); the storm had apparently decreased in energy, as vessels to the west of the centre reported northerly to northwesterly winds of force 5 to 7, and the wind remained moderate in front of the depression. On the 29th the disturbance was near the Irish coast.

VII.—This disturbance was apparently central over the northern part of the Gulf of Saint Lawrence on the 21st; moving northeastward it was shown near N. 52°, W. 48°, on the 22d. On that date, the s. s. "Oregon," in N. 54° 27′, W. 44° 14′, reported barometer 29.56 (750.8), wind sse., force 3; and the s. s. "Grecian," in N. 54° 24′, W. 44° 17′, barometer 29.57 (751.1), wind ssw., force 2, cloudy. The s. s. "Scandinavian," in N. 50° 3′, W. 44° 19′, also reported barometer 29.63 (752.6), wind very unsteady, from se. to w., cloudy, with occasional rain squalls. On the 23d the s. s. "Oregon," in N. 55° 19′, W. 36° 29′, reported barometer 29.33 (745.0), wind ssw., force 4. During the day the disturbance moved northeastward, and disappeared beyond the field of observation.

VIII.—The data relating to this disturbance, which was apparently a tropical hurricane, are very meagre prior to the 28th, so that, at the present writing, it is impossible to determine when and where the storm originated. The following reports may have some connection therewith:

On the 24th the bark "N. Boynton," in N. 24°, W. 60°, took a heavy squall with rain; the wind increased to a hurricane and the vessel lost boats, stove bulwarks, and had decks swept. 25th, the bark "Paolina" in N. 25° 49′, W. 62° 22′, took a hurricane from nw. veering to sw. and w., lasting until the 28th, (N. 28° 42′, W. 68° 02′,) lost and split sails. Same day the brig "Maggie Glen," in N. 25° 14′, W. 64° 59′, encountered a hurricane; vessel was thrown on her beam ends and abandoned; Captain Knock, who has made fifty-eight trips to the West Indies, reports that this was the most violent hurricane he ever experienced. The ship "Eclipse" reported: August 19th, in N. 16°, longitude not given, (probably between W. 45° and 55°,) threatening weather, raining in torrents constantly for four days, wind hauled to sse.; appearances indicating a cyclone, hove to for twelve hours, when the weather began to improve, but on proceeding to the northwestward it grew worse again; followed it along until the 28th, in N. 29° 40′, W. 64°, then hove to again; in twenty-four hours the weather cleared and the wind hauled to sw. On the 28th the bark "Alsen," in N. 32°, W. 71°, had a strong ne. gale, lasting twenty-four hours.

The reports used in tracing this disturbance are the following: The brig "Daphne," on the 28th, in N. 35° 07′, W. 66° 46′, reported, 2.30 a. m., heavy se. gale, which continued with great force until 2.30 a. m. of the 29th, when it blew a hurricane. The vessel was knocked down, the sea making a complete breach over her; cut away the foretopmast backstays, the foretopmast going over the side and carrying with it the foremast head, maintopmast, jibboom and all attached. The foresail was well secured, but it was blown and washed out of the gaskets and lost. The weather remained stormy throughout the 29th, 30th, and 31st. At Bermuda the wind blew with the force of a fresh gale from se. on the 28th, changing on the 29th to a moderate sw. gale, squally weather. Vessels near the seventieth meridian had strong ne. gales, with long heavy south, and short east, swells. After passing Bermuda the storm-centre appears to have moved nearly due north, low area vi., of chart i., probably uniting with this disturbance during its passage along the coasts.

On the 29th the storm-centre was near N. 40°, W. 67°, the bark "Chignecto," in N. 40° 15′, W. 65° 00′, had a severe sse. gale, shifting to nw. blowing with hurricane force for twelve hours, lost sails, etc. The s. s. "State of Nevada," reported at 2 a. m., (Greenwich mean time,) 29th, light e. wind; 6 a. m., fresh breeze from same direction, with heavy showers and lightning in the northwest; 10 a. m., moderate gale increasing rapidly; noon, N. 41° 02′, W. 66° 04′, barometer 29.68 (753.9), gale increasing and veering to ne. with constant rain; 2.45 p. m., blowing a whole gale from ne. with very high sea; 7 p. m., wind moderating and veering to west, lowest barometer 28.98 (736.1), at 4. p. m. By midnight of the 29th the storm-centre was probably at no great distance from the coast of Nova Scotia, when the course changed to the eastward; great damage was done to vessels in the harbors of Cape Breton island, and many vessels put into Halifax to repair damages. The storm was very disastrous to fishing vessels on the Banks; many of these, being disabled in the gale of the 26th, were unable to reach port before the present hurricane swept over them, and were not in a condition to withstand it. Vessels as far eastward as the fifty-seventh meridian, reported terrific gales on the 29th. On the 30th the storm-centre was near N. 45°, W. 57°, as indicated by the following: s. s. "British Princess," 10 a. m., (Greenwich mean time,) 30th, strong gale set in, force 9 to 10, continued till 3.40 p. m., when it began to moderate, minimum barometer reading during the gale 29.38 (746.2), wind sw. At 5.40 a. m., five hours before the height of the gale, the barometer read 29.75 (765.6); the wind afterward shifted to wnw., force 9 to 10, ship's position at noon N. 40° 30′, W. 56° 10′. S. S. "Fulda," reported 3 a. m., (Greenwich mean time) 30th, wind began to back and increased in force; the following observations were taken during the gale:

Hour.	Barometer (corrected.)		Wind.		Remarks.
	Inches.	Mill.	Direction.	Force	
4 a. m.....	29.79	756.7	se.	6	Heavy rain; lightning at intervals.
8 a. m.....	29.16	740.7	sse.	8	
9 a. m.....	29.20	741.7	ssw.	9–10	Heavy and breaking sea.
10 a. m.....	29.25	742.9	sw. by w.	9–10	
11 a. m.....	29.36	745.7	sw	9–10	
12 m.....	29.41	747.0	sw. by w.	9–8	Position, N. 43° 26′, W. 58° 47′.
4 p. m.....	29.81	757.2	w.	7	Moderating.

S. S. "Habsburg:"

Hour.	Barometer (corrected.)		Wind.		Remarks.
	Inches.	Mill.	Direction.	Force	
3.46 a. m.....	29.89	759.2	se.	7	
7.50 a. m.....	29.40	746.7	se.	9	
8.50 a. m.....	29.23	742.4	s.	9	Minimum.
9.50 a. m.....	.....	.....	sw.	10	
10.50 a. m.....	.....	.....	sw.	10	

From 11 a. m. the barometer began to rise, and at 11.50 a. m. it read 29.5 (749.3), wind wsw., force 10; at 0.47 p. m. (near N. 43° 15′, W. 57° 20′), wind decreasing; 3.47 p. m., wind w. by s., force 8, barometer 29.7 (754.4); 7.51 p.m., wind wnw., force 6, barometer 29.94 (760.5); a very heavy sea prevailed during the storm. The s. s. "Rotterdam," reported, 4 a. m., barometer 29.2 (741.7), wind sw., force 10, perfect storm, high cross sea; 7 a. m., barometer 29.03 (737.3), wind w., force 9, gradually decreasing; the wind changed during the time of the heaviest gusts; the upper atmosphere was clear, but below were dense clouds of haze or scud, rendering it impossible to see ahead; the sea was white with foam and fearfully high; lightning was observed in the southwest and west. At noon the ship's position was N. 42° 45′, W. 59° 24′.

During the day the storm continued its northeastward course, maintaining all its fury, and by the 31st it was probably central near N. 52°, W. 36°. The s. s. "Arizona" in N. 47° 55′, W. 45° 22′, reported 12.08 p. m. (Greenwich mean time), barometer 30.09 (764.3), wind sse., force 4, barometer falling rapidly and wind increasing; 9 p. m., barometer 29.42 (747.3), wind s., force 7; 2 a. m. of the 31st, the wind gradually hauled to wsw., force 9, and the barometer read 29.32 (744.7), very heavy sea; 2.30 a. m., wind suddenly hauled into ne., force 7, and the barometer rose even more rapidly than it had fallen, the weather became fine but the high westerly sea kept up. At 12.08 p. m. of the 31st the s. s. "Waesland," in N. 49° 15′, W. 36° 34′, reported barometer 29.23 (742.4), wind nnw., force 10, high confused sea. This storm was probably identical with that reported by vessels between W. 30° and the British coasts on September 1st and 2d, and appears to have lost none of its violence on nearing the coasts.

OCEAN ICE.

Chart ii. also exhibits the southern and eastern limits of icebergs in the north Atlantic during the month of August, 1883. This chart is based on reports communicated by shipmasters to this office, reports furnished through the co-operation of the "New York Herald Weather Service," and other data published in the "New York Maritime Register."

The small number of vessels reporting icebergs during August, 1883, seems to indicate that these dangers to navigation are rapidly disappearing from the ice-region of the north Atlantic. The easternmost icebergs reported during the month were observed near the forty-fourth meridian, the southern limits being about N. 43° 30′.

Compared with the chart for the preceding month, (July, 1883,) a slight change is shown in the extent of the ice-region, the eastern limit having moved about 1° to the eastward, while the southern limit is also about 1° further north than in last month.

Icebergs were reported as follows:

2d.—Ship "Hagarstown," in N. 43° 27′, W. 50° 25′, saw a very large iceberg.

3d.—S. S. "Frisia," in N. 45° 51′, W. 47° 53′, passed an iceberg about one hundred and twenty feet high; s. s. "Grecian Monarch," in N. 45° 56′, W. 49° 0′, passed two icebergs; s. s. "Grecian," in N. 53° 6′, W. 50° 0′, passed a large iceberg. Saw none east of this.

5th.—S. S. "Abyssinia," in N. 45° 46′, W. 48° 54′, passed a large iceberg bearing ssw., distant about six miles.

6th.—S. S. "Schiedam," in N. 45° 30′, W. 48° 54′, passed a large iceberg.

7th.—S. S. "Oder," in N. 44° 55′, W. 49° 4′, passed a large iceberg; s. s. "Cassius," in N. 44° 12′, W. 53° 40′, passed an iceberg two hundred feet high.

8th.—Bark "Diamant," in N. 44° 36′, W. 48° 40′, passed a large iceberg; s. s. "Donau," in N. 44° 22′, W. 48° 57′, passed an iceberg two hundred and sixty feet high.

10th.—S. S. "France," in N. 43° 26′, W. 51° 41′, passed a large iceberg.

11th.—Bark "Carpasian," about ninety miles ene. of Saint John's, Newfoundland, passed a number of icebergs.

23d.—Ship "Amelia," in N. 48°, W. 44°, passed several large icebergs; s. s. "Grecian," in N. 53° 0′, W. 50° 45′, saw a large iceberg; from there to Belle Isle, passed only five icebergs; Straits quite clear.

28th.—S. S. "Clintonia," in N. 48° 40′, W. 45° 0′, passed two large icebergs.

TEMPERATURE OF THE AIR.

[*Expressed in degrees, Fahrenheit.*]

The distribution of mean temperature over the United States and Canada, for the month of August, 1883, is exhibited on chart iii., by the dotted isothermal lines.

In the first column of the following table are shown the normal temperatures of August in the several districts, as determined from the Signal-Service records; the second column shows the mean temperature of August, 1883, and the third column shows the departures of August, 1883, from the normal:

Average Temperatures for August, 1883.

Districts.	Average for August. Signal-Service observations.		Comparison of Aug., 1883, with the average for several years.
	For several years.	For 1883.	
	°	°	°
New England	69.5	68.1	1.4 below.
Middle Atlantic states	73.8	72.3	1.5 below.
South Atlantic states	79.3	78.2	1.1 below.
Florida peninsula	82.2	82.9	0.7 above.
Eastern Gulf	79.6	79.5	0.1 below.
Western Gulf	81.6	81.1	0.5 below.
Tennessee	77.2	74.6	2.6 below.
Ohio valley	75.9	72.1	3.8 below.
Lower lakes	70.1	66.5	3.6 below.
Upper lakes	67.3	63.5	3.8 below.
Extreme northwest	66.3	62.7	3.6 below.
Upper Mississippi valley	74.6	70.2	4.4 below.
Missouri valley	75.1	70.9	4.2 below.
Northern slope	69.0	66.7	2.3 below.
Middle slope	72.5	72.9	0.4 above.
Southern slope	79.6	80.2	0.6 above.
Southern plateau	78.5	78.3	0.2 below.
North Pacific	64.4	62.4	2.0 below.
Middle Pacific	70.5	69.7	0.8 below.
South Pacific	80.6	79.9	0.7 below.
Mount Washington, N. H	47.5	43.8	3.7 below.
Pike's Peak, Colo	39.0	38.8	0.2 below.
Salt Lake City, Utah	74.4	76.4	2.0 above.
Brownsville, Texas	83.1	83.6	0.5 above.

The mean temperature for August is below the normal over the whole country, except in Florida and over an area extending from southern Texas northwestward to Utah, where it is slightly above the normal, and in the east Gulf states, where a normal condition has prevailed. The deficiencies are most marked from the lower lake region and Ohio valley westward to the Missouri valley and extreme northwest, where they vary from 3°.6 in the lower lake region and extreme northwest to 4°.4 and 4°.2 in the upper Mississippi and Missouri valleys, respectively. In Tennessee and in the North Pacific coast region, the deficiencies are 2°.6 and 2°, respectively; along the Atlantic coast they vary from 1°.1 to 1°.5; and in the west Gulf states and California they are less than 1°.

In the middle and southern slopes, at Salt Lake City, Utah, and at the stations on the coast of Texas, the mean temperature has been slightly above the normal for August.

The following are some of the highest and lowest monthly mean temperatures reported from the Signal-Service stations:

Stations reporting highest.	°	Stations reporting lowest.	°
Yuma, Arizona	91.0	Pike's Peak, Colorado	38.8
Galveston, Texas	84.6	Mount Washington, New Hampshire	43.8
Key West, Florida	84.3	Cape Mendocino, California	53.6
Camp Thomas, Arizona	84.1	San Francisco, California	57.9
Cedar Keys, Florida	83.7	Marquette, Michigan	61.0
Indianola, Texas	83.6	Olympia, Washington	61.3
Brownsville, Texas	83.6	Alpena, Michigan	61.7
New Orleans, Louisiana	83.3	Escanaba, Michigan	61.9
Mobile, Alabama	82.0	Mackinaw City, Michigan	62.0
Fort Concho, Texas	81.9	Deadwood, Dakota	62.5

The general distribution of mean temperature for August,

and the districts of maximum departures from the normal in each year, beginning with 1873, are as follows:

Districts.	Maximum departures.	Year.	Remarks.
	°		
		1873...	From 2° to 5° below the normal in New England, the middle states, and lower lake region; about 3° above the normal in the upper lake region, upper Mississippi and lower Missouri valleys.
Missouri valley	+ 3.5	1874...	Normal in the upper Mississippi valley and in Minnesota; above the normal in the Missouri and Ohio valleys and Gulf states; below the normal in the Saint Lawrence valley, lake region, and on the Atlantic and Pacific coasts.
Gulf states	+ 3.0		
Ohio valley and Tennessee	+ 2.0		
Saint Lawrence valley	— 3.0		
Middle Atlantic states	— 2.6		
Pacific coast	— 2.2		
New England	+ 1.5	1875...	Below the normal in all districts except in New England.
Lower Missouri valley	— 4.0		
Upper Mississippi valley	— 4.0		
Ohio valley and Tennessee	— 3.4		
Eastern Gulf	— 3.2		
Saint Lawrence valley	+ 2.9	1876...	Normal in the upper Mississippi and Missouri valleys and in Minnesota; below the normal in the Gulf states and on the Pacific coast; above the normal in the districts east of the Mississippi river north of Tennessee and North Carolina.
Lake region	+ 2.3		
Middle Atlantic states	+ 2.0		
New England	+ 1.9		
Pacific coast	— 2.5		
Gulf states	— 1.0		
New England	+ 2.0	1877...	Slightly below the normal in the upper Mississippi and Ohio valleys; above the normal in all other parts of the country.
Lower lakes	+ 1.9		
Middle Atlantic States	+ 1.6		
Upper lakes	+ 1.5		
Ohio valley	— 0.5		
Rocky mountain stations	+ 3.4	1878...	Normal on the Pacific coast and in New England; slightly below the normal in the Saint Lawrence valley; above the normal in all other districts.
Upper lakes	+ 2.9		
Minnesota	+ 2.7		
South Atlantic states	+ 2.3		
Ohio valley and Tennessee	+ 2.2		
Saint Lawrence valley	— 0.8		
Northern slope	+ 1.2	1879...	Above the normal in the northern slope and in the districts west of the Rocky mountains; below the normal in all other districts except normal in Florida.
Western plateau	+ 1.0		
Saint Lawrence valley	— 4.0		
Rio Grande valley	— 3.2		
Eastern Gulf	— 2.9		
Ohio valley and Tennessee	+ 1.0	1880...	Normal in the south Atlantic states; slightly above the normal in the Ohio, upper Mississippi and lower Missouri valleys; below the normal in all other districts.
Upper Mississippi valley	+ 0.7		
Rio Grande valley	— 6.2		
Upper Missouri valley	— 4.2		
Northern slope	— 3.9		
Northern plateau	— 3.3		
Western Gulf	+ 3.6	1881...	Below the normal in the northern slope and west of the Rocky mountains; above the normal in all other districts, except slightly below in Florida.
Middle slope	+ 3.4		
Minnesota	+ 3.3		
Northern plateau	— 5.6		
North Pacific coast	— 3.5		
Middle Pacific coast	— 3.1		
South Pacific coast	+ 1.6	1882...	Normal in the middle and south Atlantic states and Florida; slightly above the normal in New England, the extreme northwest, northern slope, southern California, and in the northern and middle plateau districts; below the normal in all other parts of the country.
Northern plateau	+ 1.5		
Northern slope	+ 1.2		
Southern slope	— 6.6		
Western Gulf	— 3.3		
Rio Grande valley	— 3.2		
Tennessee	— 3.0		

DEVIATIONS FROM MEAN TEMPERATURE.

The departures exhibited by the reports from the regular Signal-Service stations are shown in the table of average temperatures for August, 1883. Voluntary observers report the following notes in connection with this subject:

Connecticut.—Southington, Hartford county: mean temperature, 65°.8, is, with the exception of that for 1874, the lowest August mean recorded during the last twenty-nine years.

Illinois.—Anna, Union county: mean temperature, 75°.1, is 2°.2 below the August mean of the last eight years.

Riley, McHenry county: mean temperature, 65°.6, is 3° below the August average of twenty-two years. The mean temperature of the summer of 1883 is 1°.9 below the summer mean of the same period.

Swanwick, Perry county: mean temperature, 71°.1, is 5° below the August normal.

Indiana.—Vevay, Switzerland county: mean temperature, 73°.3, is 1°.6 below the August average.

Wabash, Wabash county: mean temperature, 69°.7, is 2°.7 below the August average of seven years.

Logansport, Cass county: mean temperature, 69°.4, is 4°.8 below the August average of the last twenty-four years, and is the lowest August mean temperature of that period, with the exception of 67°.2 in 1863, and 68°.4 in 1866.

Kansas.—Wellington, Sumner county: mean temperature, 79°.3, is 2°.3 above the August average of four years.

Lawrence, Douglas county: mean temperature, 72°.4, is 4°.55 below the average of sixteen years, and is the lowest August mean of that period.

Maine.—Gardiner, Kennebec county: mean temperature, 64°.6, is 2°.2 below the August mean of forty-seven years.

Maryland.—Fallston, Harford county: mean temperature, 70°.1, is 1°.6 below the August average of ten years.

Sandy Springs, Montgomery county: mean temperature, 69°.1, is 3°.9 below the August average of the last fifteen years, and is the coldest August of that period. The mean temperature of the summer season of 1883 is also the lowest summer mean of the last fifteen years.

New Jersey.—Freehold, Monmouth county: mean temperature, 67°.4, is 3° below the August average of eight years.

New York.—North Volney, Oswego county: mean temperature, 64°.9, is 3°.3 below the average of sixteen years, and is, with the exception of 64°.8 in 1874, the lowest August mean of the period; the highest August mean temperature, 71°.3, occurred in 1872. The mean temperature of the summer months of 1883 is 66°.0, or 1°.6 below the summer average of fifteen years.

Ohio.—Wauseon, Fulton county: mean temperature, 65°.5, is 4°.8 below the August average of thirteen years. The highest August mean temperature of that period, 72°.8, occurred in 1872; the lowest, 63°.0, occurred in 1870.

Pennsylvania.—Dyberry, Wayne county: mean temperature, 62°.4, is 2°.9 below the August average of sixteen years. During that period the highest August mean temperature, 71°.7, occurred in 1878; the lowest, 59°.2, occurred in 1866. The extremes for August, 1883, are: maximum 87°; minimum 37°; and the August extremes for the last sixteen years are: maximum 92° in 1874, and on two dates in 1881; minimum 37°, in 1874 and 1883.

Texas.—New Ulm, Austin county: mean temperature, 83°.5, is 1°.3 above the August average of the last twelve years. During that period the highest August mean, 84°.4, occurred in 1874; the lowest, 79°.4, occurred in 1882.

Vermont.—Woodstock, Windsor county: mean temperature, 63°.7, is 1°.3 below the August mean of the last sixteen years. The highest August mean of that period, 68°.4, occurred in 1877; the lowest, 60°.7, occurred in 1869.

Virginia.—Variety Mills, Nelson county: mean temperature, 70°.8, is 3°.1 below the August mean of the last six years.

West Virginia.—Helvetia, Randolph county; mean temperature, 66°.5, is 1°.4 below the August average of the last seven years.

MONTHLY RANGES OF TEMPERATURE.

The following are the largest monthly ranges of temperatures reported during the month:

Fort Custer, Montana, 65°; Dayton, Washington Territory, 64°; Fort Buford, Dakota, 60°; Fort Shaw, Montana, 57°; Coeur d'Alene, Idaho, and Spokane Falls, Washington Territory, 57°; Fort Bennett, Dakota, 56°; Cheyenne, Wyoming, 54°; Fort Benton, Montana, 54°; Fort Meade, Dakota, 52°; Helena, Montana, 49°; Huron, Dakota, West Las Animas, Colorado, and Los Angeles, California, 48°.

The smallest monthly ranges are: New Orleans, Louisiana, 19°; Galveston, Texas, 20°; Key West, Florida, 21°; Cape Mendocino, California, and Pike's Peak, Colorado, 22°; Pensacola, Florida, and Delaware Breakwater, Delaware, 23°; Jacksonville, Florida, and Indianola, Texas, 24°; Hatteras, North Carolina, and Block Island, Rhode Island, 25°; and 28° at the following stations: Barnegat, New Jersey; Ocean city, Maryland; Fort Macon, North Carolina; Sanford, Florida.

GREATEST DAILY RANGES OF TEMPERATURE.

The greatest daily ranges of temperature have varied in the different districts as follows:

New England.—From 17° on the summit of Mount Washington, New Hampshire, on the 24th, to 30° at Boston, Massachusetts, on the 13th, and at New Haven, Connecticut, on the 31st.

Middle Atlantic states.—From 19° at Barnegat city, New Jersey, on the 13th, to 28° at Cape Henry, Virginia, on same date.

South Atlantic states.—From 16° at Fort Macon, North Carolina, on the 1st, to 24° at Charlotte and Smithville, North Carolina, on the 13th and 31st, respectively.

Florida peninsula.—From 17° at Key West, on the 31st, to 22° at Sanford on the 23d.

Eastern Gulf.—From 16° at New Orleans, Louisiana, on the 9th, to 25° at Vicksburg, Mississippi, on the 31st, and at Mobile and Montgomery, Alabama, on the 22d and 31st, respectively.

Western Gulf.—From 17° at Galveston, Texas, on the 8th and 29th, to 34° at Fort Smith, Arkansas, on the 30th.

Tennessee.—From 22° at Chattanooga, on the 12th and 17th, to 29° at Knoxville, on the 31st.

Ohio valley.—From 22° at Cincinnati, Ohio, on the 21st, to 27° at Columbus, Ohio, on the 26th.

Lower lakes.—From 22° at Sandusky, Ohio, on the 12th and 19th, to 34° at Oswego, New York, on the 22d.

Upper lakes.—From 21° at Chicago, Illinois, on the 25th, to 32° at Alpena, Michigan, on the same date.

Extreme northwest.—From 40° at Saint Vincent, Minnesota, on the 24th, to 44° at Fort Buford, Dakota, on the 23d.

Upper Mississippi valley.—From 20° at Cairo, Illinois, on the 26th, to 33° at Saint Paul, Minnesota, on the 23d.

Missouri valley.—From 24° at Omaha, Nebraska, on the 22d, to 43° at Fort Bennett, Dakota, on the 23d and 24th.

Northern slope.—From 30° at North Platte, Nebraska, on the 29th, to 50° at Fort Custer, Montana, on the 23d.

Middle slope.—From 17° on the summit of Pike's Peak, Colorado, on the 10th and 15th, to 42° at West Las Animas, Colorado, on the 24th.

Southern slope.—From 32° at Coleman City, Texas, on the 1st, to 41° at Fort Stockton, Texas, on the 30th.

Table of Comparative Maximum Temperatures for the Month of August.

State or Territory.	Maximum for August, 1883, Signal Service.		Maximum since Signal-Service stations were opened—3 to 12 years.			Highest from any other source.			
	Station.	Temp.	Station.	Temp.	Year.	Place.	Temp.	Year.	Length of Record
		°		°			°		
Alabama	Mobile	99	Montgomery	103	1874	Mount Vernon Arsenal	104	1860	31 years.
Arizona	Yuma	111	Yuma	115	1879	Fort Mojave	119	1875	22 "
Arkansas	Fort Smith	100	Little Rock	102	1881	Fort Smith	102	1800	41 "
California	Red Bluff	101	Red Bluff	110	1878	Fort Yuma	117	1879	32 "
Colorado	West Las Animas	100	Denver	105	1878	Fort Lyon	108	'68, '69	21 "
Connecticut	New Haven	85	New Haven	90	'73 '79 '81	New Haven	98	1804	87 "
Dakota	Yankton	98	Smithville	112	1881	Fort Randall	108	1863	22 "
Do	Fort Buford	96	Fort Sully	107	1876	Fort Lincoln	110	1870	12 "
Delaware	Delaware Breakwater	87	Delaware Breakwater	93	1881	Fort Delaware	101	1865	44 "
District of Columbia	Washington	94	Washington	101	'74, '81	Washington	101		48 "
Florida	Sanford	97	Jacksonville	100	1874	Fort Barrancas	103	1878	60 "
Do	Key West	95	Lake City	99	1874	Fort King	100	1833	10 "
Georgia	Augusta	96	Augusta	105	1878	Augusta Arsenal	100	1845	51 "
Do	Savannah	95	Savannah	100	1878	McPherson Barracks	101	'77, '81	7 "
Idaho	Fort Lapwai	108	Boisé City	103	1879	Fort Boisé	121	1871	17 "
Do	Coeur d'Alene	95	Fort Lapwai	115	1882	Fort Lapwai	103		11 "
Illinois	Cairo	92	Springfield	100	1881	Anna	109	1881	5 "
Do	Springfield	90	Cairo	103	1881	Chicago	102	1868	48 "
Indiana	Indianapolis	91	Indianapolis	101	1881	Laconia	105	1881	7 "
Do						Vevay	104	1881	13 "
Indian Territory	Fort Supply	96	Fort Gibson	106	1874	Fort Gibson	116	1834	53 "
Do			Fort Supply	107	1881	Fort Sill	109	1871	3 "
Iowa	Dubuque	92	Des Moines	103	1881	Fort Madison	103	1870	22 "
Do	Des Moines	91	Keokuk	102	1873	Muscatine	104	1881	43 "
Kansas	Leavenworth	93	Leavenworth	107	1874	Fort Riley	108	18-0	25 "
Do			Dodge City	102	1881	Fort Leavenworth	106	1881	51 "
Kentucky	Louisville	94	Louisville	105	1881	Newport Barracks	96	1870	28 "
Louisiana	New Orleans	92	Shreveport	105	1881	Baton Rouge	102	'60, 77	55 "
Do			New Orleans	99	'74, 77	Point Pleasant	104	1881	7 "
Maine	Portland	87	Portland	95	1879	Brunswick	98		53 "
Maryland	Baltimore	92	Baltimore	98	1881	Fort McHenry	100	'34 '49 '72	50 "
Massachusetts	Boston	92	Boston	97	1881	Amherst	98	1864	45 "
Do	Provincetown	90	Springfield	93	'79, '81	New Bedford	91	1818?	69 "
Michigan	Port Huron	90	Detroit	99	1881	Marquette	100		22 "
Do	Detroit	89	Port Huron	96	1881	Thornville	101	1881	3 "
Minnesota	Saint Paul	88	Breckenridge	101	1876	Fort Ridgeley	102	1861	11 "
Do	Saint Vincent	82	Saint Paul	98	1880	Fort Snelling	97	1838	62 "
Mississippi	Vicksburg	96	Vicksburg	100	1878	Columbus	99		10 "
Do						Brookhaven	100	1875	5 "
Missouri	Saint Louis	97	Saint Louis	106	1881	Saint Louis	108	1834	48 "
Montana	Fort Custer	101	Fort Benton	108	1881	Fort Ellis	112	1875	14 "
Nebraska	North Platte	92	Omaha	105	1874	Fort McPherson	110	1870	15 "
Nevada			Winnemucca	102	1882	Camp Halleck	106	1875	14 "
New Hampshire	Mount Washington	58	Mount Washington	72	1870	Auburn	100	1870	5 "
New Jersey	Little Egg Harbor	92	Sandy Hook	90	1881	Atco	100	1881	7 "
Do	Atlantic City	91	Little Egg Harbor	98	1882	Vineland	100	1881	7 "
New Mexico	Fort Bayard	98	La Mesilla	107	1878	Fort Bascom	108	1870	6 "
New York	Oswego	89	Oswego	97	1881	Auburn	110	1801	39 "
North Carolina	Wilmington	96	Charlotte	101	1881	Fort Johnson	101	1875	56 "
Do	Charlotte	94	Wilmington	99	1878	Weldon	107	1881	7 "
Ohio	Cleveland	92	Cincinnati	101	1881	Cincinnati	100		38 "
Do	Columbus	92	Cleveland	99	1881	Bellefontaine	104	1881	7 "
Oregon	Roseburg	86	Umatilla	110	1882	Fort Dalles	104	1853	10 "
Pennsylvania	Erie	92	Pittsburg	100	1881	Mount Joy	105	18-9	9 "
Do	Philadelphia	90	Philadelphia	99	1881	Philadelphia	98	1881	123 "
Rhode Island	Narragansett Pier	85	Newport	87	'76, '79,	Providence	95	1826	35 "
South Carolina	Charleston	90	Charleston	98	1881	Charleston	90	1752	104 "
Tennessee	Memphis	94	Nashville	104	1874	Humboldt	104	'70, 74	4 "
Texas	Fort Concho	103	Rio Grande City	108	1879	Fort Clarke	113	1871	25 "
Utah	Salt Lake City	94	Salt Lake City	101	1875	Camp Douglass	105	1871	25 "
Do						Mount Carmel	100	1877	7 "
Vermont			Burlington	97	1876	Lunenburg	100	1824	20 "
Do						Charlotte	102	'76, '81	6 "
Virginia	Lynchburg	93	Lynchburg	100	1881	Alexandria	104	18-3	11 "
Do	Norfolk	94	Cape Henry	103	1881	Fortress Monroe	99	1881	56 "
Washington	Dayton	100	Almota	109	1882	Fort Walla Walla	107	'59, '60	12 "
West Virginia			Morgantown	92	'74, '81	Flemington	93	1881	1 "
Wisconsin	La Crosse	89	Milwaukee	98	1874	Fort Howard	100	'23-26 '30	30 "
Wyoming	Cheyenne	90	Cheyenne	95	1881	Fort Laramie	107	1876	37 "
Do			Fort Washakie	103	1882	Fort Fetterman	107	1869	5 "

Southern plateau.—From 26° at Fort Grant, Arizona, on the 31st, to 40° at Fort Apache, Arizona, on the 13th and 30th.

Northern plateau.—From 42° at Spokane Falls, Washington Territory, on the 15th, to 50° at Dayton, Washington Territory, on the 19th.

North Pacific coast.—From 27° at Olympia, Washington Territory, on the 27th, to 32° at Portland, Oregon, on the 26th.

Middle Pacific coast.—From 21° at Cape Mendocino, California, on the 6th, to 38° at Sacramento, California, on the 2d.

South Pacific coast.—From 34° at Yuma, Arizona, on the 14th, to 38° at Los Angeles, California, on the 6th.

Table of Maximum and Minimum Temperatures for August, 1883.

State or Territory.	Signal Service.			U. S. Army Post Surgeons, or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
		°	°		°	°
Alabama	Mobile	99	68	Birmingham	99	56
Do	Montgomery	97	65	Tuscaloosa	97	47
Arizona	Yuma	111	74	Texas Hill	119	82
Do	Fort Apache	92	50	Fort Bowie	96	61
Arkansas	Fort Smith	100	61	Lead Hill	102	56
Do	Little Rock	98	62	Mount Ida	90	50
California	Red Bluff	101	56	Whitewater	113	80
Do	Cape Mendocino	68	47	Summit	75	42
Colorado	West Las Animas	100	52	Fort Lyon	101	51
Do	Pike's Peak	53	31	Fort Garland	82	38
Connecticut	New Haven	85	48	Southington	89	46
Dakota	Yankton	98	42	Fort Randall	99	40
Do	Fort Buford	96	36	Fort Meade	98	38
Delaware	Del. Breakwater	87	64			
District of Columbia	Washington	94	55	West Washington	95	52
Florida	Sanford	97	69	Limona	99	70
Do	Pensacola	92	70	Live Oak	100	62
Georgia	Augusta	96	63	Way Cross	105	64
Do	Atlanta	91	60	Toccoa	97	51
Idaho	Fort Lapwai	108	36	Fort Lapwai	108	38
Illinois	Cairo	92	61	Mattoon	96	52
Do	Chicago	89	54	Polo	90	43
Indiana	Indianapolis	91	53	Clinton	95	46
Do				Spiceland	91	46
Indian Territory	Fort Supply	96	59	Fort Reno	96	57
Iowa	Dubuque	92	49	Fort Madison	98	52
Do	Des Moines	91	48	Nora Springs	88	42
Kansas	Leavenworth	93	53	Fort Scott	97	61
Do				Holton	94	46
Kentucky	Louisville	94	58	Frankfort	93	47
Louisiana	New Orleans	92	74	Coushatta	103	56
Maine	Portland	87	48	Orono	84	36
Maryland	Baltimore	92	59	McDonogh	94	45
Do	Ocean City	85	57	Woodstock	92	50
Massachusetts	Boston	92	48	Milton	98	47
Do	Provincetown	90	53	Rowe	84	37
Michigan	Port Huron	90	48	Thornville	94	52
Do	Marquette	88	35	Harrisville	93	33
Minnesota	Saint Vincent	82	39	Minneapolis	94	50
Do	Saint Paul	88	46	Fort Snelling	96	42
Mississippi	Vicksburg	96	65	Meridian	103	48
Missouri	Saint Louis	97	58	Greenfield	98	56
Do				Centreville	94	47
Montana	Fort Custer	101	36	Fort Keogh	103	36
Do	Fort Shaw	90	33	Fort Ellis	93	26
Nebraska	North Platte	92	48	Fort Niobrara	102	40
Do	Omaha	91	52	Fort Robinson	94	37
Nevada				Hot Springs	103	46
Do				Boca	88	30
New Hampshire	Mount Washington	58	20	Grafton	88	35
New Jersey	Little Egg Harbor	92	55	Moorestown	94	54
Do	Atlantic City	91	55	Phillipsburg	84	46
New Mexico	Fort Bayard	96	55	Lordsburg	100	70
Do				Fort Union	85	42
New York	Oswego	89	52	North Volney	92	53
Do	Buffalo	84	47	Johnstown	88	34
North Carolina	Wilmington	96	62	Chapel Hill	101	53
Do	Smithville	92	58	Highlands	83	45
Ohio	Cleveland	92	48	College Hill	99	54
Do	Columbus	92	50	Wauseon	93	41
Oregon	Roseburg	86	45	Fort Klamath	90	35
Do	Portland	80	44	Eola	87	55
Pennsylvania	Erie	92	50	Grampian Hills	94	44
Do	Philadelphia	90	58	Dyberry	87	37
Rhode Island	Narragansett Pier	85	45			
South Carolina	Charleston	96	65	Stateburg	95	60
Tennessee	Memphis	94	62	Andersonville	94	50
Do	Knoxville	94	53	Grassy Cove	89	43
Texas	Fort Concho	103	61	Cuero	106	68
Do	Stockton	98	54	Paris	103	61
Utah	Salt Lake City	94	52	Corinne	105	65
Do				Ogden	102	44
Vermont				Charlotte	90	50
Do				Woodstock	89	36
Virginia	Lynchburg	95	56	Johnsontown	95	64
Do	Fort Myer	91	49	Wytheville	86	45
Washington	Dayton	100	36	Fort Spokane	100	35
West Virginia				Helvetia	88	43
Wisconsin	La Crosse	89	52	Lancaster	91	44
Do	Milwaukee	88	51	Neillsville	90	41
Wyoming	Cheyenne	90	36	Fort Washakie	92	32
Do				Fort Bridger	88	26

FROSTS.

Colorado.—Pike's Peak, 5th, 6th, 13th, 26th; Fort Collins, 20th, 22d, 23d.

Connecticut.—Southington, 28th.

Dakota.—Webster, 27th. At Fort Buford, a heavy frost occurred on the 27th, killing garden vegetables.

Indiana.—Griffin station, 24th; Wabash, 24th, 25th.

Iowa.—Dubuque, 4th; Nora Springs, 22d, 23d; Cresco, 23d, Independence, 23d; Manchester, 23d, 24th.

Maine.—Cornish, 28th, 29th; Portland, 27th, 31st; Bangor, 29th; Orono, 29th.

Massachusetts.—Rowe, 27th, 28th; Westborough, 27th, 28th, 30th; Milton, 28th, 29th; Fall River, 30th.

Michigan.—East Tawas, 3d; Traverse City, 5th, 14th, 15th; Marquette, 14th; Escanaba, 14th, 15th; Alpena, 14th, 15th, 27th; Lansing, 25th, 26th; Ionia, 27th; Northport, 27th.

Montana.—Fort Maginnis, 22d; Fort Shaw, 22d; Poplar River, 22d. At Fort Custer, all vegetables in the post garden were injured by the heavy frost of the 22d.

Nebraska.—Clear Creek: the light frost of the morning of the 23d caused slight injury to vegetables.

Nevada.—Carson City: frost occurred here on the morning of the 13th, killing garden vegetables. Frosts also occurred here on the 20th, 21st, 22d.

New Hampshire.—Mount Washington, 7th, 14th to 17th, 26th to 31st. At Grafton, the first killing frost occurred on the mornings of the 27th and 28th.

New York.—Factoryville, 7th, 27th; Palermo, 27th; Friendship, 27th; Humphrey, 28th; Menand station (near Albany), 28th. Kiantone: frost occurred in this locality on the 27th, causing serious injury to corn and other crops.

Pennsylvania.—Wellsboro', 7th, 8th, 27th; Dyberry, 7th, 8th, 25th to 28th. Erie: frost occurred in the southern part of Erie county on the morning of the 26th, which proved destructive to the buckwheat crop. In the French valley, fourteen miles north of Erie, many acres of corn were ruined.

Utah.—Nephi, 20th.

Vermont.—Woodstock, 15th, 20th, 27th; Strafford, 27th; Saint Johnsburg, 28th.

Wisconsin.—Neillsville, 23d; Lancaster, 24th.

ICE.

Mount Washington, New Hampshire: ice formed in pools to a thickness of three-fourths of an inch on the 27th.

Wabash, Indiana: ice was reported to have formed in this locality on the morning of the 24th.

PRECIPITATION.

[*Expressed in inches and hundredths.*]

The distribution of rainfall over the United States and Canada for the month of August, 1883, as determined from reports from more than six hundred stations, is exhibited on chart iv.

The rainfall for August, 1883, has been below the average over the whole country, with the exception of the extreme northwest, and the northern and middle slopes. The deficiencies are marked in the districts on the Atlantic and Gulf coasts, and also in the upper lake region, upper Mississippi and Ohio valleys. In the lower lake region, Missouri valley, and Tennessee, the deficiencies are small and vary from 0.29 in the Missouri valley, to 0.61 in the lower lake region. In the Atlantic and Gulf states, from Virginia to Texas, the rainfall for the preceding month was below the average, and the small average precipitation in the same states during August has not been sufficient to terminate the drought which prevailed during July.

In the first column of the following table is given the average rainfall for August in the various districts for several years; in the second column is given the average of August, 1883; and the third column shows the excess or deficiency of August, 1883, as compared with the average of that month in previous years:

Average precipitation for August, 1883.

Districts.	Average for August. Signal-Service observations.		Comparison of Aug., 1883, with the average for several years.
	For several years.	For 1883.	
	Inches.	*Inches.*	*Inches.*
New England	4.33	1.53	2.80 deficiency.
Middle Atlantic states	4.95	3.20	1.75 deficiency.
South Atlantic states	6.43	7.51	0.72 deficiency.
Florida peninsula	7.67	5.69	1.98 deficiency.
Eastern Gulf	6.33	4.39	1.94 deficiency.
Western Gulf	4.27	1.62	2.65 deficiency.
Tennessee	3.92	3.51	0.41 deficiency.
Ohio valley	3.70	1.94	1.76 deficiency.
Lower lakes	2.91	2.30	0.61 deficiency.
Upper lakes	3.12	1.25	1.87 deficiency.
Extreme northwest	2.50	2.70	0.20 excess.
Upper Mississippi valley	3.40	1.87	1.53 deficiency.
Missouri valley	2.81	2.52	0.29 deficiency.
Northern slope	1.39	1.83	0.44 excess.
Middle slope	1.42	3.65	2.23 excess.
Southern slope	2.99	1.95	1.04 deficiency.
Southern plateau	3.16	2.26	0.90 deficiency.
North Pacific coast	0.78	0.08	0.70 deficiency.
Middle Pacific coast	0.02	0.00	0.02 deficiency.
South Pacific coast	0.22	0.07	0.15 deficiency.
Mount Washington, N. H.	7.67	6.06	1.61 deficiency.
Pike's Peak, Col.	4.81	2.22	2.59 deficiency.
Salt Lake City, Utah	0.88	0.62	0.26 deficiency.
Brownsville, Texas	5.94	1.97	3.97 deficiency.

Chart iv. shows the heaviest precipitation to have occurred along the immediate coast from Charleston, South Carolina, to Jacksonville, Florida, and in the vicinities of Kittyhawk, North Carolina, and Pensacola, Florida. At Kittyhawk, the monthly rainfall was 12.39, or 4.89 above the August average; of this amount, 10.75 fell during the 15th and 16th, and 8.14 fell between 8.50 a. m., and 1 p. m., of the 15th, which is the heaviest precipitation that has been recorded at that place during the last eight years. Notwithstanding these heavy rainfalls, the general averages for the south Atlantic and east Gulf states have been below the normal, which is due to the small extent of the areas of excessive precipitation.

No rain fell in the middle Pacific coast region during August, and in the north Pacific coast region the average rainfall for the district was 0.08, or a deficiency of 0.70. On the summits of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the monthly rainfall has been 1.61 and 2.59 below the average, respectively.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The departures exhibited by the reports from the regular Signal-Service stations are shown in the table of average precipitation for August, 1883. Voluntary observers report the following notes in connection with this subject:

Connecticut.—Southington, Hartford county: monthly rainfall 1.66. In only three of the last twenty-nine years has the August rainfall been less than this amount.

Illinois.—Anna, Union county: monthly rainfall, 4.02, is 0.76 below the August average of the last eight years.

Riley, McHenry county: monthly rainfall, 1.17, is 3.32 below the August average of the last twenty-two years. The rainfall for the summer season of 1883 is 3.65 below the average of the same period.

Indiana.—Vevay, Switzerland county: monthly rainfall, 2.27, is 0.92 below the August average of the last eight years.

Wabash, Wabash county: monthly rainfall, 2.11, is 1.02 below the August average of seven years.

Logansport, Cass county: monthly rainfall, 2.61, is 0.63 below the average of August since 1859. During that period the largest August precipitation, 9.14, occurred in 1876; the smallest, 0.29, occurred in 1861.

Kansas.—Lawrence, Douglas county: monthly rainfall, 2.12, is 1.44 below the August average of sixteen years. The total precipitation for the eight months ending August 31st is 31.15, or 6.55 above the average of the corresponding period for the last fifteen years.

Wellington, Sumner county: monthly rainfall, 3.51, is 1.66 above the average of the last four years.

Maine.—Gardiner, Kennebec county: monthly rainfall, 0.32, is 3.44 below the August average of forty-seven years, and with the exception of 0.20 in 1876, it is the smallest August rainfall for that period.

Maryland.—Fallston, Harford county: monthly rainfall, 3.56, is 1.50 below the August average of twelve years.

New Hampshire.—Grafton, Grafton county: monthly rainfall, 1.44, is 0.46 below the average of five years.

New York.—North Volney, Oswego county: monthly rainfall, 1.50, is 0.85 below the August average of twelve years. The total rainfall for the summer months is 10.00, or 0.59 below the average of summer for the last eleven years. The largest summer rainfall of that period, 14.30, occurred in 1874; the smallest, 6.10, occurred in 1876.

The general distribution of rainfall during the month of August, and the districts of maximum departures from the August normal, of each year since 1873, are as follows:

Districts.	Maximum departures.	Year.	Remarks.
		1873...	Marked excesses in Minnesota and the middle Atlantic states; normal in the south Atlantic and east Gulf states; deficient in the other districts.
New England	+ 2.60	1874...	Excessive in New England, Tennessee, upper Mississippi valley, and Minnesota; normal in California; deficient in the lake region, in the Missouri, Ohio, and Saint Lawrence valleys, and in the states bordering on the Atlantic and Gulf from New Jersey to Texas. Serious drought prevailed in the lower lake region, Ohio valley, and Gulf states, and from northern Texas to Nebraska.
Minnesota	+ 1.50		
Tennessee	+ 1.30		
Western Gulf	— 3.40		
South Atlantic states	— 2.30		
Saint Lawrence valley	— 2.00		
Middle Atlantic states	+ 5.80	1875...	Normal in the Saint Lawrence valley; deficient in the Ohio valley and Tennessee, and on the Pacific coast; above the average in all other districts, the excess in the middle Atlantic states being unusually large.
Missouri valley	+ 1.70		
Western Gulf	+ 1.45		
Pacific coast	— 0.35		
Ohio valley and Tennessee	— 0.35		
Upper Mississippi valley	+ 1.55	1876...	Excessive in Minnesota, the upper Mississippi, Missouri, and Ohio valleys, upper lake region, and west Gulf states; deficient in the Saint Lawrence valley, lower lake region, and middle Atlantic states; normal in the south Atlantic and East Gulf states, and on the Pacific coast.
Ohio valley	+ 1.20		
Upper Missouri valley	+ 1.20		
New England	— 3.05		
Middle Atlantic states	— 2.25		
Lower lakes	— 1.75		
Portland, Oregon	+ 1.06	1877...	Normal in the lower lake region and Saint Lawrence valley; slight excesses in the upper lake region, New England, and Tennessee; deficient in California, Minnesota, the upper Mississippi and Ohio valleys, and in the south Atlantic and Gulf states. An excess of 1.06 occurred at Portland, Oregon.
Upper lakes	+ 0.73		
New England	+ 0.70		
Middle Atlantic states	— 2.50		
Minnesota	— 1.58		
Western Gulf	— 1.56		
Middle Atlantic states	+ 2.02	1878...	Excessive in the Saint Lawrence valley and in the states bordering on the Atlantic and Gulf; deficient in the districts north of the Ohio and Missouri rivers and on the Pacific coast.
Saint Lawrence valley	+ 1.10		
New England	+ 0.81		
Upper Missouri valley	— 1.91		
Minnesota	— 1.40		
Upper lakes	— 0.83		
Eastern Gulf	+ 6.26	1879...	Deficient in the districts from the Saint Lawrence valley and New England westward to the Rocky mountains, and in California; very large excesses in the Ohio valley, middle Atlantic and Gulf states; slight excesses in the south Atlantic states and at Portland, Oregon.
Ohio valley	+ 4.60		
Middle Atlantic states	+ 3.75		
Missouri valley	— 1.88		
Minnesota	— 1.78		
Upper Missouri valley	— 1.40		
Florida peninsula	+ 4.03	1880...	Excessive in New England, the south Atlantic states, Florida, and from the lake region westward to the Rocky mountains; deficient in the Saint Lawrence and Ohio valleys, middle Atlantic and Gulf states, and on the Pacific coast.
Lower lakes	+ 1.70		
Lower Missouri valley	+ 1.32		
Eastern Gulf	— 1.47		
Saint Lawrence valley	— 1.21		
Western Gulf	— 0.99		
Minnesota	+ 1.50	1881...	Excessive in the east Gulf states, Florida, Minnesota, and in the north Pacific coast region; deficient in all other districts. Serious drought prevailed over nearly the whole country east of the Rocky mountains.
Florida	+ 1.42		
Eastern Gulf	+ 1.35		
Middle Atlantic states	— 3.46		
Ohio valley	— 3.23		
New England	— 2.75		
Southern slope	+ 4.59	1882...	Excessive in the districts from the lake region and middle Atlantic states southwestward to Texas, New Mexico, and Arizona; deficient in New England, the upper Mississippi and Missouri valleys, extreme northwest, northern and middle slopes, north and south Pacific coast regions, and in Florida; normal in the south Atlantic states.
Eastern Gulf	+ 3.21		
Western Gulf	+ 1.90		
New England	— 2.84		
Missouri valley	— 2.34		
Extreme northwest	— 1.79		

Table of Excessive, Greatest, and Least Monthly Rainfalls.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration	Amount.	Station.	Amt.
Alabama.					*Arizona.*	
Mobile	6	3.30	3hr. 30m.	6.47	Yuma	0.22
Do.	11	1.12	40 m.		*California.*	
Calera	2	4.90			Alta	0.00
Do.	23	2.30			Antioch	0.00
Arizona.					Auburn	0.00
Fort Apache	3	2.57			Borden	0.00
Fort Thomas	18, 19	1.69			Brentwood	0.00
Arkansas.					Brighton	0.00
Lead Hill	1, 2	3.57			Byron	0.00
Mount Ida	5	2.55			Caliente	0.00
Delaware.					Calistoga	0.00
Saint George	2	3.20			Cape Mendocino	0.00
District of Columbia.					Chico	0.00
Washington	23	1.34	1 hr. 55 m.		Cisco	0.00
Florida.					Colfax	0.00
Pensacola	8, 9	2.20		8.75	Colton	0.00
Do.	25, 26	2.55			Davis	0.00
Archer	3	2.48		8.61	Delano	0.00
Do.	7	2.00			Dunnigan	0.00
Jacksonville	25, 26	3.11		7.63	Emigrant Gap	0.00
Sanford				6.74	Farmington	0.00
Waldo	8, 9	3.24		6.63	Fenner	0.00
Fernandina	8, 9	3.94		6.41	Fort Bidwell	0.00
Mayport	8, 9	2.24			Fort Gaston	0.00
Georgia.					Fresno	0.00
Griffin Station	8	10.38	8 hours	12.90	Galt	0.00
Savannah	7, 8	6.33		9.28	Gilroy	0.00
Jesup	7	2.02		9.22	Goshen	0.00
Walthourville				9.15	Hollister	0.00
Rome				7.80	Ione	0.00
Brunswick	1	2.20		7.78	Keen	0.00
Thomasville	22	2.80		7.37	Kingsburg	0.00
Newnan				6.47	Livermore	0.00
Gainesville	26	2.80		6.29	Los Angeles	0.00
Albany	22	2.80		6.17	Martinez	0.00
Cartersville	15, 16	3.41			Menlo Park	0.00
Forsyth	8	2.05			Merced	0.00
Indiana.					Modesto	0.00
Spiceland	23	2.78		6.35	Mojave	0.00
Evansville	15	3.39			Monterey	0.00
Indian Territory.					Napa	0.00
Fort Reno	6	3.50			Newhall	0.00
Iowa.					Niles	0.00
Logan	7	2.20			Oakland	0.00
Dubuque	19	1.19	1 hr. 9 m.		Oakwood	0.00
Kansas.					Orland	0.00
Topeka	18	2.01			Pejaro	0.00
Louisiana.					Petaluma	0.00
Alexandria	18	3.00		8.00	Pleasanton	0.00
Do.	22	3.11			Princeton	0.00
New Orleans	17	2.08	2 h. 25 m.		Ravenna	0.00
Maryland.					Red Bluff	0.00
Fort McHenry	29	2.70			Reading	0.00
Michigan.					Rocklin	0.00
Litchfield	20	2.13			Sacramento	0.00
Minnesota.					Salinas City	0.00
Northfield	17	2.26			San Diego	0.00
Saint Vincent	19	2.15			San Fernando	0.00
Mississippi.					San Francisco	0.00
Columbus	24	2.30			San Jose	0.00
Brookhaven	16	2.19			San Mateo	0.00
Missouri.					Santa Cruz	0.00
Carthage				6.42	Solidad	0.00
Saint Louis	15	1.85	1 h 25 m.		South Vallejo	0.00
Nebraska.					Spadra	0.00
Lincoln	11	6.50?		11.25?	Stockton	0.00
Do.	17	4.25?			Suisun	0.00
Fremont	17	2.00			Summit	0.00
New Hampshire.					Sumner	0.00
Mount Washington				6.06	Tehachapi	0.00
New Jersey.					Tehama	0.00
Reading				6.00	Tennant	0.00
Somerville	2	2.58			Tracy	0.00
Sandy Hook	2	2.19			Tulare	0.00
Freehold	2	2.06			White Water	0.00
New Mexico.					Willows	0.00
Fort Bayard				7.67	Woodland	0.00
Fort Union	12	2.34	50 m.		Anaheim	t'ce
New York.					Poway	t'ce
Penn Yan	28	2.20			Daggets	0.06
Ithaca	28, 29	2.17			*Colorado.*	
Friendship	28, 29	2.00			Fort Lyon	0.24
North Carolina.					*Dakota.*	
Kittyhawk	15	8.14		12.39	Fort Yates	0.09
Do.	16	2.16			Fort Meade	0.36
Goldsboro'	16	3.20		6.26	*Idaho.*	
Lenoir	26	2.50		6.00	Lewiston	0.00
Wilmington	25	3.40	5 h. 45 m.		Coeur d'Alene	0.08
Nova Scotia.					Fort Lapwai	0.14
Sidney				6.10	*Louisiana.*	
Ohio					Point Pleasant	t'ce
Cleveland	28	1.78			Coushatta	0.06
Columbus	28	1.40	40 m.		Grand Coteau	0.42
Pennsylvania.					*Maine.*	
Hulmerville	1, 2	4.65			Gardiner	0.32
Fallsington	1, 2	4.53			Portland	0.36
West Chester	2	3.95			Fort Preble	0.40
Philadelphia	2	2.86	7 h 30 m.		Eastport	0.49
South Carolina.					*Massachusetts.*	
Yemassee	17, 18	6.66		11.17	Charleston	0.32
Charleston	8	4.88		10.05	Boston	0.39
Do.	17, 18	2.59			*Michigan.*	
Tennessee.					Ione	0.07
Manchester				6.38	Lansing	0.21
Riddleton				6.28	Kalamazoo	0.42

Table of Excessive, Greatest, and Least Monthly Rainfalls.—Continued.

Station.	Specially heavy.			Largest monthly.	Smallest monthly.	
	Date.	Amt.	Duration.	Amount.	Station.	Amt.
Tennessee.—Continued.					*Michigan.*—Cont'd.	
Milan	15	3.05			Grand Haven	0.46
Nashville	1, 2	2.64			*Minnesota.*	
Texas.					Minneapolis	0.47
Fort Elliott	6, 7	2.05		6.56	*Mississippi.*	
Withe	2, 3	5.30			Macon	0.05
Paris	4, 5, 6	5.18			*Missouri.*	
Fort Concho	22, 23	2.73			Mexico	0.19
Virginia.					Warrenton	0.40
Chincoteague	29, 30	4.46		7.43	*Montana.*	
Wisconsin.					Fort Maginnis	0.37
Neillsville	17	2.90			*Nevada.*	
					Boca	0.00
					Beowawe	0.00
					Golconda	0.00
					Hot Springs	0.00
					Humboldt	0.00
					Reno	0.00
					Truckee	0.00
					Brown's	0.01
					Carson City	0.02
					Winnemucca	0.05
					Palisade	0.10
					Toano	0.13
					Otego	0.14
					Tecoma	0.15
					Wells	0.28
					Oregon.	
					Eola	0.00
					Roseburg	0.03
					Albany	0.08
					Fort Klamath	0.10
					Portland	0.19
					Texas.	
					Hearne	t'ce
					Belton	0.05
					Rio Grande City	0.10
					Cuero	0.26
					Palestine	0.30
					Houston	0.37
					Utah.	
					Promontory	0.08
					Kelton	0.10
					Corinne	0.20
					Blue Creek	0.40
					Washington.	
					Fort Canby	t'ce
					Olympia	0.01
					Bainbridge Island	0.06
					Fort Spokane	0.15
					Dayton	0.30
					Fort Townsend	0.30
					Wisconsin.	
					Milwaukee	0.38
					Sussex	0.48
					Wyoming.	
					Fort Washakie	0.20
					Fort Bridger	0.50

Ohio.—Wauseon, Fulton county: monthly rainfall, 1.67, is 1.37 below the August average of eleven years. The largest August rainfall of that period, 4.72, occurred in 1880; the smallest, 1.25, occurred in 1881.

Pennsylvania.—Dyberry, Wayne county: monthly rainfall, 0.95, is 2.03 below the August average of twelve years.

Texas.—New Ulm, Austin county: monthly rainfall, 2.19, is 1.28 below the August average of twelve years. The largest August rainfall during that period, 8.38, occurred in 1878; the smallest, 0.55, occurred in 1877.

Vermont.—Woodstock, Windsor county: monthly rainfall, 1.04, is 1.47 below the August average of the last fifteen years. The largest August rainfall of that period, 6.75, occurred in 1872; the smallest, 0.81, occurred in 1876.

Virginia.—Variety Mills, Nelson county: monthly rainfall, 2.29, is 1.70 below the August average of the last five years.

West Virginia.—Helvetia, Randolph county: monthly rainfall, 1.73, is 3.35 below the August average of the last seven years.

HAIL.

Rochester, New York.—On the afternoon of the 2d a severe hail storm occurred at points north of this city; hailstones, varying from the size of a pea to half an inch in diameter, fell for about twenty minutes, destroying fields of oats and wheat, stripping acres of corn and breaking the glass in dwellings and green-houses.

Cheyenne, Wyoming.—Heavy hail fell at this place from 2.20 to 2.30 p. m. of the 5th.

Saint Vincent, Minnesota.—A heavy rain storm occurred

between 4 and 5.20 p. m. of the 8th, during which considerable hail fell. At a point of five miles west of this place the hailstones are reported to have been as large as hens' eggs, and caused much damage to corn and wheat.

Clear Creek, Saunders county, Nebraska.—A severe hail storm occurred five miles south of this place on the 13th, causing much damage to the growing corn.

Bismarck, Dakota.—Heavy hail fell at this station between 5.38 and 5.40 p. m. of the 18th. At points north and east of here considerable damage was done to the grain fields.

Niagara, Dakota.—A severe hail storm occurred south of this place at about 4 a. m. of the 19th. The storm passed from the southern edge of Devil's lake northeastward between this place and Larimore. The wheat crop suffered serious injury on Forest river and in Elk valley.

Very large hail accompanied the storm of the night of the 7–8th, in Iowa, which is described under the heading "local storms."

Hail storms of less severity have been reported from the various states as follows:

Arizona.—Fort Thomas, 9th; Fort Grant, 25th.

Arkansas.—Lead Hill, 1st.

Colorado.—Fort Garland, 23d, 25th.

Connecticut.—Southington, 1st, 8th, 19th, 23d.

Dakota.—Alexandria, 17th; Deadwood, 14th; Fort Hale, 8th; Fort Sisseton, 28th; Fort Totten, 17th, 18th.

Georgia.—Atlanta, 13th.

Iowa.—Guttenburg, 10th.

Minnesota.—Moorhead, 27th.

Nebraska.—Clear Creek, 8th; De Soto, 7th; Utica, 8th, 11th.

New Hampshire.—Contocookville, 20th.

New Mexico.—Fort Union, 12th.

New York.—Albany, 19th; Ardenia, 13th; Friendship, 18th; New York City, 19th.

Pennsylvania.—Wellsboro', 23d.

Tennessee.—Austin, 15th; Milan, 1st, 15th.

Texas.—Fort Concho, 22d.

Wisconsin.—Beloit, 27th.

SNOW.

Fort Collins, Colorado.—Light snow fell at this place during the early morning of the 1st.

Fort Shaw, Montana.—Heavy rain fell during the afternoon of the 21st, changing to snow at 6.15 p. m., which continued for thirty-five minutes.

Snow fell on the summit of Pike's Peak, Colorado, on the 2d, 3d, 4th, and from the 9th to 12th.

SLEET.

On the summit of Pike's Peak, Colorado, sleet was reported on the following dates: 1st to 5th, 8th, 9th, 11th, 12th, 15th, 25th, 27th, 28th.

Table of rainy and cloudy days, relative humidity, and dew-point for Aug., 1883.

Districts.	Rainy days.	Cloudy days.	Rel. humidity. *	Dew-point.
			Percentages.	° °
New England	From 7 to 12	From 1 to 6	From 66.6 to 79.6	From 55.1 to 62.2
Middle Atlantic states	" 5 " 10	" 3 " 4	" 60.8 " 83.2	" 54.4 " 66.8
South Atlantic states	" 10 " 17	" 2 " 12	" 61.6 " 82.6	" 61.3 " 73.7
Florida peninsula	" 10 " 18	Three	" 71.3 " 77.1	" 72.1 " 74.3
East Gulf	" 8 " 16	From 0 to 3	" 69.1 " 77.1	" 68.5 " 72.8
West Gulf	" 4 " 10	" 0 " 6	" 65.0 " 75.6	" 66.2 " 73.8
Ohio valley	" 8 " 13	" 3 " 5	" 61.6 " 65.9	" 54.9 " 59.6
Tennessee	" 9 " 17	" 3 " 4	" 72.1 " 76.4	" 62.1 " 66.4
Lower lakes	" 8 " 12	" 2 " 6	" 64.7 " 72.1	" 54.2 " 57.5
Upper lakes	" 5 " 13	" 1 " 8	" 67.1 " 77.9	" 49.9 " 57.1
Extreme northwest	" 9 " 11	" 3 " 5	" 66.7 " 81.8	" 51.9 " 54.2
Upper Mississippi valley	" 5 " 12	" 2 " 9	" 66.0 " 71.4	" 55.4 " 64.3
Missouri valley	" 8 " 16	" 4 " 7	" 68.4 " 78.1	" 56.8 " 62.7
Northern slope	" 2 " 15	" 1 " 14	" 40.6 " 72.2	" 35.0 " 59.2
Middle slope	" 8 " 12	" 0 " 9	" 48.6 " 58.0	" 47.5 " 56.8
Southern slope	" 4 " 8	" 0 " 3	" 50.7 " 56.5	" 57.8 " 61.0
Southern plateau	" 5 " 20	" 0 " 5	" 42.3 " 65.6	" 53.6 " 59.8
Northern plateau	" 1 " 2	none	" 46.9 " 48.3	" 45.9 " 49.0
North Pacific	" 1 " 4	From 0 to 7	" 63.0 " 71.9	" 48.6 " 52.8
Middle Pacific	" 0 " 1	" 0 " 6	" 33.7 " 89.2	" 45.2 " 54.4
South Pacific	" 0 " 5	" 0 " 3	" 49.8 " 76.4	" 58.6 " 67.4
Mt. Washington, N. H.	Sixteen	none	92.0	41.6
Pike's Peak, Col	Fifteen	One	73.5	30.3
Salt Lake City, Utah	Seven	Three	35.4	45.6

* Relative humidity corrected for altitude.

COTTON REGION REPORTS.

Temperature and rainfall observations in the cotton region were continued during August, 1883. The averages for the various districts are determined from observations made at the stations, as shown on chart vi., issued with the REVIEW for April, 1882. For the purpose of comparison, the averages for August, 1882, and those for August, 1883, with the departures, are given in the table below:

Meteorological Record of the Cotton Districts for the months of August, 1882 and 1883.

Districts.	Average rainfall in inches.			Temperatures. Mean of the maxima.			Mean of the minima.			Extremes for Aug., 1883.	
	1882.	1883.	Departures.	1882.	1883.	Change.	1882.	1883.	Change.	Max.	Min.
				°	°	°	°	°	°	°	°
New Orleans	8.38	2.70	— 5.68	89.8	90.9	+ 1.1	72.0	70.4	— 1.6	103	55
Savannah	6.21	5.64	— 0.57	90.6	91.0	+ 1.0	71.0	71.4	+ 0.4	105	62
Charleston	6.12	5.66	— 0.46	90.4	90.0	— 0.4	68.9	68.5	— 0.4	100	54
Atlanta	5.99	5.03	— 0.96	85.7	89.0	+ 3.3	67.5	67.0	— 0.5	99	51
Wilmington	6.24	2.90	— 3.28	87.8	88.7	+ 0.9	67.8	67.5	— 0.3	108	49
Memphis	4.30	3.41	— 0.89	87.1	87.5	+ 0.4	67.2	65.0	— 2.2	98	50
Galveston	5.44	0.93	— 4.49	91.7	96.3	+ 4.6	70.2	73.4	+ 3.2	106	61
Vicksburg	4.66	2.60	— 2.06	89.1	92.5	+ 3.4	69.6	69.8	+ 0.2	99	55
Montgomery	4.01	3.16	— 0.85	88.6	92.2	+ 3.6	68.7	68.7	0.0	99	47
Augusta	4.26	3.13	— 1.13	88.4	90.4	+ 2.0	68.8	68.1	— 0.7	102	51
Little Rock	3.44	3.41	— 0.03	88.3	91.9	+ 3.6	65.3	65.6	+ 0.3	103	54
Mobile	3.96	2.32	— 1.64	90.2	93.7	+ 3.5	70.0	68.9	— 1.1	103	48

From the above table it will be seen that, as in the preceding month, the average rainfall of August, 1883, is below that of August, 1882, the deficiencies being largest in the districts of New Orleans and Galveston, where they are 5.68 and 4.49, respectively. The means of the maxima temperatures for August, 1883, have been higher in all districts except for the district of Charleston, while the means of minima temperatures differ but little from those of August, 1882.

WINDS.

The most frequent directions of the wind during the month of August, 1883, at the Signal Service stations are shown on chart iii., by arrows flying with the wind. Over the greater part of the country they were variable; in Tennessee, the south Atlantic and east Gulf states, they were mostly from the northeast; in Texas and the Ohio valley, they were southerly; on the north Pacific coast, they were northerly; and on the California coast, they were from the west and northwest.

TOTAL MOVEMENTS OF THE AIR.

[*In miles.*]

In the following table are given the stations reporting the largest and smallest total movements of the air in each of the various districts:

Districts.	Stations reporting largest.	Miles.	Stations reporting smallest.	Miles.
New England	Block Island, R. I.	9,452	New London, Conn.	3,233
Middle Atlantic states	Barnegat City, N. J.	10,046	Lynchburg, Va.	2,240
South Atlantic states	Hatteras, N. C.	11,301	Augusta, Ga.	2,329
Florida peninsula	Cedar Keys	5,492	Sanford	3,641
East Gulf	Pensacola, Fla.	4,631	New Orleans, La.	2,275
West Gulf	Indianola, Tex.	6,710	Fort Smith, Ark.	2,401
Ohio valley	Louisville, Ky.	4,660	Indianapolis	2,545
Tennessee	Memphis	3,512	Chattanooga	3,087
Lower lakes	Sandusky, Ohio	7,597	Cleveland, Ohio	4,985
Upper lakes	Milwaukee, Wis.	7,063	Duluth, Minn.	4,239
Extreme northwest	Fort Buford, Dak.	6,696	Saint Vincent, Minn.	4,396
Upper Mississippi valley	Saint Louis, Mo.	5,347	Dubuque, Ia.	3,237
Missouri valley	Huron, Dak.	6,420	Omaha, Neb.	1,621
Northern slope	North Platte, Neb.	6,000	Deadwood, Dak.	2,533
Middle slope	West Las Animas, Col.	5,583	Denver, Col	4,409
Southern slope	Fort Stockton, Tex.	5,976	Coleman City, Tex.	4,056
Southern plateau	Fort Apache, Ariz.	4,138	El Paso, Tex	2,694
Northern plateau	Dayton, Wash.	3,771	Spokane Falls, Wash.	2,557
North Pacific	Portland, Oregon	2,289	Olympia, Wash	1,371
Middle Pacific	San Francisco, Cal.	9,029	Red Bluff, Cal.	3,695
South Pacific	Los Angeles, Cal.	3,924	Yuma, Arizona	3,524

On the summits of Mount Washington, New Hampshire, and Pike's Peak, Colorado, the total movements of the air were 25,550, and 9,268, miles, respectively.

HIGH WINDS.

On the summit of Mount Washington, New Hampshire,

maximum velocities of fifty miles or more per hour occurred on the following dates: 1st, 2d, 3d, 4th, 5th, 6th, 7th, 8th, 13th, 14th, 20th, 21st, 22d, 23d, 24th, 26th, 27th. The highest velocities recorded were as follows: 72, nw., 4th; 80, nw., 5th; 94, nw., 6th (maximum for month); 80, nw., 21st; 72, nw., 22d; 76 nw., 24th; 76, nw., 26th; 76, nw., 27th.

On the summit of Pike's Peak, Colorado, the highest velocity recorded was 48, w., 17th.

Other stations reporting velocities of forty miles or more per hour, are as follows: Sandy Hook, New Jersey, 55, e., 2d; Fort Assinniboine, Montana, 52, sw., 16th, and 43, w., 20th; Fort Bennett, Dakota, 51, nw., 16th; Block Island, Rhode Island, 47, ne., 29th; Cape May, New Jersey, 47, nw., 2d; New York City, 45, e., 2d; North Platte, Nebraska, 44, e., 10th; Indianola, Texas, 43, ne., 17th; Barnegat City, New Jersey, 40, n., 2d; Delaware Breakwater, Delaware, 40, s., 2d; Fort Benton, Montana, 40, s., 26th.

LOCAL STORMS.

Galveston, Texas.—A despatch from Midlothian, Ellis county, on the 3d, stated that a violent wind and rain storm occurred there on the evening of that date, during which a hotel and livery stable were blown down, and the contents of a lumber yard were scattered great distances over the prairie. The hotel was completely destroyed, and several persons were buried beneath the ruins.

Paris, Bourbon county, Kentucky.—The heavy rain and wind storm of the 10th caused considerable damage to the crops in this locality.

Wall Lake, Sac county, Iowa.—The storm on the night of the 7–8th was the severest that has been experienced in this county during the present year. The wind blew with great force, and was accompanied by a heavy fall of rain and hail. Bridges were washed out in various parts of the county, and the creeks and streams rose to unusual heights. Damage to the extent of thousands of dollars was done to the crops and other property in this county. A large quantity of window-glass was broken, and small animals and poultry were killed, by the hail. In some localities the grain was so completely destroyed that no attempt will be made to harvest it.

Des Moines, Iowa.—During the night of the 7–8th a hail storm of great severity passed through the valley of the Nishnebotene river, along the Audubon branch of the Chicago, Rock Island & Pacific railroad. All crops in the path of the storm, which was about four miles wide, were almost completely destroyed. Several houses were blown down, and a number of cars were lifted from the track. At Gray, Audubon county, it is reported that the hail covered the fence tops, and the trains were delayed until the hail was cleared from the track. Twenty-one of a herd of cattle were killed near Gray, where hailstones were found that measured thirteen inches in circumference. Seven miles north of Audubon, a dwelling was blown down, killing one of the inmates. The approach of the storm was preceded by a deafening roar.

Mr. F. W. Bowen, a volunteer observer of the Signal Service, at Humboldt, Iowa, reports that a remarkable hail storm occurred in Sac county, in that state, on the 8th. The hailstones were unusually large, and covered the ground to a great depth. Two days after the storm there remained, in places, large quantities of the unmelted hailstones.

Chattanooga, Tennessee.—On the afternoon of the 15th a destructive local storm passed over this city. There were two distinct tornado formations—one coming from the northwest, and the other from the northeast, uniting over the East Tennessee railroad depot, and afterwards continued its course for a distance of about one-half mile. The full force of the storm was of about four minutes' duration, from 5.18 to 5.22 p. m. Before uniting, the length of the tracks was about one and one-half miles, and its average width was two hundred yards. Hail fell during the storm, some of the hailstones measuring three-fourths of an inch in diameter. The damage to property was comparatively small, and is estimated at $3,000.

Galveston, Texas.—A despatch, dated August 18th, from Waco, McLennan county, states that on the afternoon of the 16th a tornado struck the village of Oglesby, destroying the station house and a store, and scattering their contents over the prairie.

Duluth, Minnesota.—The high northwesterly winds of the 19th and 20th caused considerable damage at Agate Bay. Several small boats were driven ashore, and a scow laden with lumber was completely wrecked, and the lumber lost.

Toronto, Ontario.—A severe storm visited northwestern Ontario on the 19th. At Listowell the streets were covered with water to a depth of two feet. Several buildings and bridges were washed away and other property destroyed. At Wingham the river rose twelve feet, and a bridge and the railroad track at that place were washed away. Large quantities of standing grain were destroyed.

Winnipeg, Manitoba.—A severe storm visited this region on the 20th. A number of buildings in the suburbs were blown down, and several in the city were damaged.

At about 6 p. m., of the 21st, the town of Rochester, Minnesota, was visited by a most violent and destructive tornado, which destroyed a large part of the town. Throughout the day the weather had been unsettled, but it was not unusually threatening. At 3 p. m. a dark cloud arose in the west, which passed over, accompanied by high wind and a slight fall of rain. At 5 p. m. a low bank of cloud was observed in the southwest, which rose rapidly, but it presented only the appearance of an ordinary thunder-cloud. As it neared the city it assumed a threatening appearance, the whole sky becoming tinged with green. In the upper part of the city the darkness was not great, but in the lower part it became as dark as night. The approach of the tornado cloud was preceded by the usual roaring sound, which served as a warning to many persons, who sought protection in the cellars of the houses and escaped without injury. In Rochester one hundred and thirty-five dwellings were completely destroyed, together with their contents, and a large number of others were unroofed or otherwise damaged. Thirty-one persons were killed and about one hundred were more or less seriously injured. A train on the Rochester and Northern division of the Chicago & Northwestern railroad, while running at a high rate of speed, was blown from the track and wrecked between Rochester and Zumbrota, Minnesota. A number of the passengers were killed, and nearly every one on the train sustained bodily injury. The path of the tornado was from west to east, and its length was about eighteen miles. A relief committee was organized, and issued circulars appealing for contributions for the aid of the sufferers. The committee, after having examined the condition of fifty farms in the track of the storm, reported that every house and barn on them was demolished, and that much valuable stock was killed, farming implements wrecked, and thousands of bushels of grain were destroyed. The loss to the farmers in Olmstead county is estimated to be not less than $200,000.

Swanwick, Perry county, Illinois.—A violent thunder-storm, coming from a northwesterly direction, occurred here on the 22d, during which the lightning struck numerous objects and caused considerable damage.

Marquette, Michigan.—Several roofs, chimneys, signs, and fences in this city were blown down during the storm of the 22d. Vessels report the storm to have been very severe on Lake Huron on that date.

Ottawa, Ontario.—A storm swept over this vicinity during the night of the 22–23d, which caused serious damage to buildings and crops.

NAVIGATION.

STAGE OF WATER IN RIVERS.

No high stages of water occurred in any of the rivers during the month.

At the most northerly stations on the Mississippi river the highest water was observed on the 1st, and also at Vicksburg, Mississippi, and New Orleans, Louisiana, on that date. The

lowest stages in the Mississippi were recorded on the 31st at Saint Louis, Missouri, and at stations southward; and between the 22d and 31st at stations north of Keokuk, Iowa. The observer at Saint Paul, Minnesota, states that, owing to the low stage of water in the upper Mississippi river during the month, it has been necessary that steamers should take barges in tow to serve as lighters.

The Missouri was highest at Yankton, Dakota, from the 1st to 4th; at Omaha, Nebraska, on the 2d; and at Leavenworth, Kansas, on the 20th. It was lowest at these stations from the 29th to 31st.

The Ohio river reached its highest stage from Cincinnati, Ohio, to Louisville, Kentucky, on the 4th and 5th; it was lowest at Cincinnati on the 20th, and at Louisville on the 27th.

Navigation in the Tennessee river at Chattanooga, Tennessee, except for small craft, was suspended on the 2d.

The highest and lowest stages of water observed at the Signal Service stations during August, 1883, are shown in the following table:

Heights of rivers above low-water mark, August, 1883.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.	
		Date.	Height.	Date.	Height.
Red River:	Ft. In.		Ft. In.		Ft. In.
Shreveport, La	29 9	1, 2, 17	8 10	10	5 9
Arkansas:					
Little Rock, Ark.	.....	.....	.....	.....	.....
Fort Smith, Ark.	.....	11	4 9	3	*—1 7
Missouri:					
Yankton, Dakota	20 0	1 to 4	3 6	29, 30, 31	2 1
Omaha, Nebr.	16 0	2	9 5	31	7 4
Leavenworth, Kans.	21 0	20	12 1	29, 30, 31	9 3
Mississippi:					
Saint Paul, Minn.	14 6	1	3 6	26	1 8
La Crosse, Wis.	18 0	1	4 10	31	1 11
Dubuque, Iowa	21 10	1	11 9	22	4 3
Davenport, Iowa	15 0	1	9 8	27	2 11
Keokuk, Iowa	14 6	3, 4	10 11	28, 29, 30	4 3
Saint Louis, Mo.	30 0	3	21 3	31	11 4
Cairo, Ill.	40 0	5	21 8	31	11 0
Memphis, Tenn.	34 0	7, 8	16 1	31	8 6
Vicksburg, Miss.	41 0	1	30 3	31	14 2
New Orleans, La†	—2 6	1, 2	—3 9	31	—11 2
Ohio:					
Pittsburg, Pa.	20 0	1	6 3	28	0 7
Cincinnati, Ohio	50 0	4	16 0	20	4 10
Louisville, Ky.	24 0	5	7 11	27	4 6
Cumberland:					
Nashville, Tenn.	42 0	3	10 1	31	1 9
Tennessee:					
Chattanooga, Tenn.	33 0	19	2 7	13	1 2
Monongahela:					
Pittsburg, Pa.	29 0	1	6 3	28	0 7
Savannah:					
Augusta, Ga.	30 0	26	7 0	12	4 1
Willamette:					
Portland, Oreg.	.....	1	7 3	31	4 0
Sacramento:					
Red Bluff, Cal.	.....	1, 2, 3	0 7	4 to 31	0 6
Sacramento, Cal.	.....	1	7 9	31	6 9
Mobile:					
Mobile, Ala.	.....	1, 29	17 3	24	15 3
Colorado:					
Yuma, Arizona	.....	6	19 9	31	16 8

* Below bench-mark. † Below high-water marks of 1874 and 1883.

HIGH TIDES.

Atlantic City, New Jersey.—Much damage was done at this place by the high tide of the 29th, which reached its highest point at 5.30 a. m. About two hundred and fifty places of business, including about twenty of the finest bathing houses, were washed away. The track of the Camden & Atlantic railroad, from this place to South Atlantic City, was covered with water, and it was reported that the meadows, three miles beyond the city, were totally inundated. Thousands of dollars worth of bathing suits were lost, and all kinds of business interests suffered serious loss. All of the railroad tracks between Atlantic City and Absecom, with the exception of the West Jersey railroad, were submerged and tracks injured. It is considered that $250,000 will not replace the property destroyed.

Seabright, New Jersey, 29th.—The high tide of this date caused a washout, of one-fourth mile in length, on the New Jersey Southern railroad, at Highland station, between this place and Sandy Hook. In some places the track was covered with more than two feet of sand, which caused serious interruption to travel. A large number of drowned cattle floated ashore between this and Highland station, which are supposed to have been washed or thrown overboard from ocean steamers.

Long Branch, New Jersey, 29th.—The beach at this place was badly washed by the high tide of this date. During the afternoon the water began running over the New Jersey railroad, opposite the highlands of Navesink. The track was undermined in several places, and at some points it was covered with nearly three feet of sand.

Newport, Rhode Island, 29th.—The heavy sea and high tide of this date washed away the platform leading from the road to the beach. The high sea prevented the steamers plying between this place and Block Island and Narragansett Pier from making their regular trips.

Ocean City, Maryland, 29th.—High tide flooding Atlantic and Wicomico avenues, and washing away a portion of the railroad bed near the station.

Boston, Massachusetts, 29th.—Very high tide and rough sea in the harbor on this date.

Block Island, Rhode Island, 12th; and unusually high on the 29th.

Portsmouth, North Carolina, 21st, 27th.

Wash Woods, North Carolina, 29th, 30th, 31st.

LOW TIDES.

Cedar Keys, Florida, 16th.

Indianola, Texas, 7th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for August, 1883, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 86.95 per cent. The percentages for the four elements are: weather, 87.63; direction of the wind, 81.74; temperature, 89.41; barometer, 87.89 per cent. By geographical districts they are: For New England, 88.04; middle Atlantic states, 91.08; south Atlantic states, 84.50; eastern Gulf, 86.49; western Gulf, 90.66; lower lakes, 88.31; upper lakes, 85.27; Ohio valley and Tennessee, 88.95; upper Mississippi valley, 83.94; Missouri valley, 81.42; north Pacific, 100.0; middle Pacific, 100.0; south Pacific, 97.91.

There were seventy-nine omissions to predict out of 3,813, or 2.07 per cent. Of the 3,734 predictions that have been made, sixty-seven, or 1.79 per cent., are considered to have entirely failed; ninety-five or 2.54 per cent. were one-fourth verified; four hundred and thirty-three or 11.60 per cent. were one-half verified; five hundred and thirty, or 14.20 per cent., were three-fourths verified; 2,609, or 69.87 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

CAUTIONARY SIGNALS.

During August, 1883, one hundred and nineteen cautionary signals were displayed. Of these, eighty-nine, or 74.79 per cent., were justified by winds of twenty-five miles or more, per hour, at or within one hundred miles of the station. One cautionary off-shore signal was displayed, which was justified both as to direction and velocity. Seven cautionary signals were changed to northwest signals. One hundred and twenty signals, of all kinds, were displayed, of which ninety, or 75.0 per cent., were fully justified. These do not include signals ordered at display stations where the velocity of the wind is only estimated. Nine signals were ordered late.

Eighty-six winds of twenty-five miles, or more, per hour were reported, for which no signals were ordered. Many of these were high local winds or strong sea-breezes.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at the Signal Service stations, during August, 1883, with the average depth at which the observations were made, are given in the table below. The highest water temperature recorded during the month, 92°.2, occurred at Ceder Keys, Florida; and

the lowest, 44°.3, occurred at Duluth, Minnesota. The largest monthly ranges of water temperature are: 24° at Provincetown, Massachusetts; 21°.8 at Duluth, Minnesota; 15°.8 at Milwaukee, Wisconsin, and 14°.3 at Cedar Keys, Florida. The smallest monthly ranges are: 1°.4 at Pensacola, Florida; 2°.2 at San Francisco, California; 2°.9 at Portland, Oregon, and 3°.5 at Grand Haven, Michigan.

Temperature of Water for August, 1883.

STATION.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.				
	°	°	°	ft.	in.	°
Atlantic City, New Jersey	69.4	61.4	8.0	5	2	70.5
Alpena, Michigan	68.7	62.7	6.0	12	1	61.7
Augusta, Georgia	90.0	80.0	10.0	5	0	76.9
Baltimore, Maryland	79.5	75.0	4.5	9	11	72.9
Block Island, Rhode Island	67.5	63.5	4.0	8	8	67.2
Boston, Massachusetts	65.7	59.4	6.3	21	4	67.6
Buffalo, New York	72.9	68.2	4.7	10	7	65.8
Cedar Keys, Florida	92.2	77.9	14.3	11	0	83.7
Charleston, South Carolina	86.1	80.1	6.0	40	8	79.9
Chicago, Illinois	70.7	64.2	6.5	8	5	68.3
Chincoteague, Virginia	82.5	71.0	11.5	5	6	72.3
Cleveland, Ohio*	76.1	68.0	8.1	14	0	66.9
Detroit, Michigan	73.0	68.0	5.0	23	1	67.7
Delaware Breakwater, Delaware	75.0	66.8	8.2	9	8	71.7
Duluth, Minnesota	66.1	44.3	21.8	14	7	62.8
Eastport, Maine	50.7	46.3	4.4	15	8	62.2
Escanaba, Michigan	64.8	55.0	9.8	15	0	61.9
Fort Macon, North Carolina	85.0	71.5	13.5	8	1	77.4
Galveston, Texas	86.0	82.0	4.0	12	0	84.6
Grand Haven, Michigan	73.3	69.8	3.5	19	0	64.5
Indianola, Texas	91.5	85.5	6.0	7	11	83.6
Jacksonville, Florida	88.5	83.0	5.5	18	0	80.8
Key West, Florida	89.7	85.2	4.5	17	3	83.7
Mackinaw City, Michigan	66.8	61.0	5.8	12	0	62.0
Marquette, Michigan	60.0	54.0	6.0	9	10	61.9
Milwaukee, Wisconsin	69.9	54.1	15.8	8	0	65.9
Mobile, Alabama	89.6	84.0	5.5	16	5	82.0
New Haven, Connecticut	77.5	69.2	8.3	15	4	67.3
New London, Connecticut	70.0	66.0	4.0	12	7	67.9
New York City	73.1	68.6	4.5	17	0	70.8
Norfolk, Virginia	81.5	75.6	5.9	16	0	76.2
Pensacola, Florida	85.7	83.3	1.4	17	3	81.0
Portland, Maine	63.0	50.5	6.5	18	10	67.9
Portland, Oregon	65.3	62.4	2.9	57	2	64.7
Provincetown, Massachusetts	71.5	47.5	24.0	12	0	68.0
Sandusky, Ohio	74.0	70.0	4.0	10	7	69.4
Sandy Hook, New Jersey	72.5	69.7	2.8	1	6	72.2
San Francisco, California	60.8	58.6	2.2	30	1	57.9
Savannah, Georgia	86.8	80.8	6.0	12	1	80.8
Smithville, North Carolina	86.2	78.0	8.2	10	0	78.1
Toledo, Ohio	75.7	71.7	4.0	11	11	69.2
Wilmington, North Carolina	85.5	80.0	5.5	20	1	78.2

* No observation from 1st to 5th, inclusive.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays were observed during the month as follows:

On the 1st, from New England westward to Dakota; on the 2d, in the upper lake region; on the 3d, at 9 p. m., at Morriston, Dakota; on the 5th, from New England westward to Minnesota; on the 6th, in Maine; on the 19th, at Wellsboro', Pennsylvania; on the 22d, in Maine and New Hampshire.

The most extended displays were those of the 1st, 5th, and 7th, of which the following reports have been received:

Eastport, Maine, 1st: an aurora was visible at this place from 9 p. m. until the early morning of the 2d.

Mount Washington, New Hampshire, 1st: an aurora was observed at this station at 10.15 p. m.; several distinct auroral beams appearing. The display was obscured by clouds at 11.40 p. m.

Marquette, Michigan, 1st: a faint aurora was seen here from 9 to 9.50 p. m.

Saint Paul, Minnesota, 1st: a pale auroral light was observed here from 10.40 to 11.35 p. m.

Eastport, Maine, 5th: faint aurora was visible from 11 p. m. until the early morning of the 6th.

Point Judith, Rhode Island, 5th: a faint aurora, of pale straw color, was observed at 9.35 p. m., which continued until the early morning of the 6th. The auroral light extended from the horizon to an altitude of 20°, and from nnw. to nne.

Gardiner, Maine, 8th: a bright aurora was visible during the evening.

Escanaba, Michigan, 5th: at 9 p. m. traces of an aurora were visible in the northwestern sky. Faint beams appeared for a few minutes, which were succeeded by a diffuse yellow light resting upon a dark base. The display ended at about 9.30 p. m.

Mackinaw City, Michigan, 5th: a poorly-defined auroral display was seen from 8.55 p. m. to 11 p. m.

Moorhead, Minnesota, 5th: a faint auroral display was visible here from 10 to 10.20 p. m.

Saint Vincent, Minnesota, 5th: a very faint auroral arch observed at 9.40 p. m.

Portland, Maine, 7th: pale auroral light from 8.30 to 10.30 p. m.

Ithaca, New York, 7th: faint aurora at 9 p. m.

Chincoteague, Virginia, 7th: an aurora was observed at this station from 8 to 9 p. m.

Woodstock, Maryland, 7th: an auroral light appeared suddenly at 8.35 p. m.; it consisted of numerous unsteady streamers, of reddish color, which had a rapid movement westward. By 8.45 p. m. the streamers had faded, leaving a diffuse light, which disappeared between 9 and 10 p. m.

Escanaba, Michigan, 7th: a faint auroral light, of greenish color, was seen in the north from 9.30 to 10 p. m.

Marquette, Michigan, 7th: faint aurora from 8.55 to 9.55 p. m.

Saint Vincent, Minnesota, 7th: a faint auroral arch was visible at 9.40 p. m.

The s.s. "Sardinian," on the 30th, in about N. 50°, W. 59°, reported a brilliant aurora visible in the northwestern sky.

THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:

New England.—1st, 2d, 3d, 5th, 7th, 10th, 11th, 13th, 18th to 24th, 26th.

Middle Atlantic states.—2d, 3d, 5th, 6th, 10th, 13th, 14th, 15th, 18th to 21st, 23d, 24th, 27th to 31st.

South Atlantic states.—1st to 8th, 10th, 11th, 13th to 18th, 20th to 29th.

Florida peninsula.—1st to 31st.

Eastern Gulf.—1st to 26th, 31st.

Western Gulf.—1st to 10th, 12th to 16th, 20th to 27th.

Tennessee.—1st, 2d, 7th to 11th, 13th, 14th, 15th, 20th to 26th, 28th, 29th.

Ohio valley.—9th, 10th, 12th, 13th, 15th, 19th, 20th, 22d, 23d, 24th, 28th.

Lower lakes.—1st, 2d, 3d, 9th, 10th, 12th, 17th to 20th, 22d, 23d, 28th, 29th.

Upper lakes.—1st, 2d, 11th, 17th to 22d, 27th, 28th, 30th.

Extreme northwest.—3d, 6th, 8th, 9th, 10th, 16th to 19th, 26th, 30th, 31st.

Upper Mississippi valley.—1st, 2d, 3d, 7th to 23d, 27th, 31st.

Missouri valley.—1st, 2d, 3d, 6th to 19th, 22d, 23d, 25th, 26th, 27th, 29th, 31st.

Northern slope.—1st to 14th, 17th, 25th, 28th to 31st.

Middle slope.—1st to 15th, 17th, 22d, 23d, 25th, 26th, 30th.

Southern slope.—1st, 2d, 6th, 9th to 13th, 20th to 24th, 26th.

Southern plateau.—1st to 12th, 14th to 21st, 23d to 29th.

Middle plateau.—1st to 5th, 9th, 10th, 11th, 16th, 25th, 28th to 31st.

Northern plateau.—4th, 5th, 24th, 25th.

Thunder-storms were also reported from the following stations not included in the districts named above: Fort Gaston, California, 31st; Oakwood, California, 28th; Poway, California, 14th; San Diego, California, 27th, 28th; Roseburg, Oregon, 1st; Portland, Oregon, 1st, 2d; Brownsville, Texas, 24th, 27th; Bainbridge Island, Washington Territory, 15th; Fort Townsend, Washington Territory, 3d.

ELECTRICAL PHENOMENA.

The observer on the summit of Pike's Peak, Colorado, reported that during a sleet and thunder-storm, on the evening of the 4th, the anemometer cups revolved in circles of electric light. After a flash of lightning the light encircling the cups

became dim, but would soon regain its former brilliancy. The observer states that, by holding up his hands, electric sparks would form on the ends of his fingers, and that his hair and clothing were full of them. A peculiar crackling noise was heard about the anemometer cups; and at the corners of the office building there were continuous sparks of bright light.

Fort Apache, Arizona, 3d.—The anemometer attachments were damaged by atmospheric electricity on this date.

Fort Stockton, Texas.—Telegraphic communication was interrupted by atmospheric electricity at this place on the 1st.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England.—1st, 10th, 12th, 14th, 15th.

Middle Atlantic states.—1st, 8th, 12th to 15th, 18th, 23d, 26th, 27th.

Eastern Gulf.—2d, 14th, 17th, 19th, 27th.

Western Gulf.—5th, 6th, 10th, 13th, 18th, 23d, 26th.

Lower lakes.—1st, 10th, 11th, 15th, 18th, 21st, 23d.

Upper lakes.—8th, 14th, 17th.

Upper Mississippi valley.—3d, 4th, 8th, 9th, 18th, 21st, 23d, 25th.

Solar halos were also reported from the following stations not included in the districts named above:

Oakwood and Poway, California, 7th, 22d; San Francisco, California, 9th, 24th, 26th, 31st; Augusta, Georgia, 13th; Jacksonville, Florida, 24th; Fort Scott, Kansas, 10th; Louisville, Kentucky, 3d; Sunman, Indiana, 8th; Saint Vincent, Minnesota, 28th; Nashville, Tennessee, 31st; DeSoto, Nebraska, 10th, 25th.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

Middle Atlantic states.—8th, 12th, 13th, 16th, 18th, 19th, 20th.

South Atlantic states.—13th, 16th to 19th.

Florida peninsula.—9th, 10th, 11th, 16th, 21st.

Eastern Gulf.—16th, 21st, 23d.

Western Gulf.—6th, 10th, 12th to 18th, 21st.

Lower lakes.—12th, 14th, 17th.

Upper lakes.—2d, 11th, 13th, 14th, 19th, 20th.

Upper Mississippi valley.—1st, 11th, 13th, 14th.

Missouri valley.—10th, 17th, 19th.

Lunar halos were also reported from the following stations, not included in the districts named above:

Oakwood, California, 18th; Red Bluff, California, 24th; Fort Grant, Arizona, 9th; Indianapolis, Indiana, 21st; Laconia, Indiana, 14th; Portland and Cornish, Maine, 15th; Boston, Massachusetts, 14th; Knoxville, Tennessee, 22d; Memphis, Tennessee, 15th; Nashville, Tennessee, 10th; Fort Concho, Texas, 10th; Fort Stockton, Texas, 18th.

MIRAGE.

Indianola, Texas, 9th.—During the middle part of the day, the court house and buildings in this city were plainly seen by people in the country, at a distance of from fifteen to sixteen miles. Mirage was also observed on the following dates: 15th, 17th, 18th, 19th, 23d, 31st.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and forty-five stations show 4,462 observations to have been made, of which nine were reported doubtful; of the remainder, 4,453, there were 3,795, or 85.2 per cent., followed by the expected weather.

SUN SPOTS.

The following record of sun spots for the month of August, 1883, has been forwarded by Professor D. P. Todd, Director of the Lawrence Observatory, Amherst, Massachusetts:

Date—Aug., 1883.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 8 a. m.	0	0	1	25‡	0	0	2	25‡	Spots probably disappeared by solar rotation.
3, 7 p. m.	0	0	1	20‡	0	0	1	2	Do.
4, 8 a. m.	1	4	0	0	1	4	2	6	
5, 10 a. m.	0	0	0	0	0	0	2	6	
6, 7 a. m.	0	0	0	0	0	0	2	5	
7, 8 a. m.	2	6	1	1	1	3	3	10	
8, 8 a. m.	2	20‡	0	0	1	10‡	4	30‡	
9, 6 a. m.	0	0	0	0	0	0	4	20‡	Spots mostly very small.
13, 9 a. m.	0	0	0	0	0	0	4	15‡	Do.
13, 8 a. m.	0	0	0	0	0	0	3	12‡	
14, 2 p. m.	0	0	0	0	0	0	2	7	
15, 7 a. m.	1	2	0	0	1	2	3	9	
17, 8 a. m.	3	7	0	0	3	7	6	13	Spots probably reappeared by solar rotation.
19, 12 m	0	0	0	0	0	0	5	10	
20, 8 a. m.	1	2	1	2	1	2	4	8	
21, 11 a. m.	0	2	0	0	0	2	3	9	
22, 3 p. m.	0	0	0	0	0	0	2	6	
24, 12 m	2	6	0	0	0	0	4	12	
25, 11 a. m.	1	10‡	1	1	0	0	4	20‡	Broad areas of faculæ.
26, 9 a. m.	0	20‡	0	0	0	0	4	40‡	Do.
27, 8 a. m.	1	4	1	4	0	0	4	40‡	Do.
28, 8 a. m.	1	20‡	0	0	0	0	5	60‡	
29, 8 a. m.	1	15‡	0	5	1	5	6	70‡	
30, 8 a. m.	0	10‡	0	0	0	5	6	80‡	
31, 10 a. m.	0	10‡	0	5	0	0	6	85‡	

Faculæ were seen at the time of every observation. ‡Approximated.

Mr. William Dawson, of Spiceland, Indiana, reports having observed sun spots during August, as follows:

4th.—Three groups, eight spots.

6th.—Two groups, seven spots.

7th.—Four groups, fourteen spots.

11th.—Five groups, twenty-three spots.

12th.—Five groups, thirty-three spots, mostly on the eastern hemisphere. A spot of moderate size, with fine penumbra, was observed in the southeastern quadrant.

18th.—Seven groups, twenty-one spots.

20th.—Four groups, seven spots.

22d.—Three groups, forty spots; one long scattering group toward the west side.

24th.—Six groups, thirty spots; one large spot in the southeastern quadrant.

27th.—Five groups, eighty-five spots; one large group in northwest quadrant, and one large spot in the southwest quadrant.

28th.—Five groups, eighty-five spots.

30th.—Six groups, one hundred and fifteen spots; one row of groups south of equator.

Mr. T. C. Hunter, at Wabash, Indiana, reports that a large number of sun spots were observed by him during August, the month closing with fourteen spots of good size still visible on the sun. They were seen on every clear day after the 10th.

Mr. H. D. Gowey, at North Lewisburg, Ohio, reports that sun spots were seen on all clear days during the month. They were most numerous on the 31st; least numerous on the 3d; smallest on the 4th, and largest on the 30th and 31st.

METEORS.

Savannah, Perry county, Illinois.—On the 2d, at about 9 p. m., a large meteor passed southward along the "milky way" leaving a brilliant trail, from 30° to 40° in length. A few minutes after midnight of the 11th, four shooting stars were seen within ten minutes. On the 16th a very large meteor was seen in the southeastern sky, which exploded, and was followed by three loud detonations. On the evening of the 27th three meteors were seen within twenty minutes.

Cairo, Illinois.—A bright meteor, of yellowish color, leaving a trail 20° in length, was observed at 9.30 p. m. of the 4th. Another meteor, of similar appearance, was seen at 9.35 p. m., and between 9 and 10 p. m., of the same date, about twenty-five meteors were seen. Numerous meteors were also observed at this station on the evening of the 5th, between 8 and 10 p. m.

New London, Connecticut.—A large number of shooting

stars were observed at this place during the early morning of the 5th and during the night of the 5–6th. Those observed on the morning of the 5th, were most numerous in the northern sky between 1 a. m. and daybreak. During the following night they were most numerous in the west and northwest, but they were seen in all parts of the sky.

Vevay, Switzerland county, Indiana.—On the evening of the 8th thirty-six meteors were observed between 8.25 and 9.30 p. m.

Los Angeles, California.—At 12.40 a. m., of the 11th, a large and brilliant meteor was observed to pass from east to west, leaving a trail which remained visible for six seconds.

New York City.—At 7.30 p. m., of the 21st, a bright meteor was observed, which exploded with a loud report when near Bedloe's Island.

Leetsdale, Allegheny county, Pennsylvania.—At 9.50 p. m., of the 23d, a brilliant meteor was observed in the northeastern sky. It first appeared about 55° above the horizon, and, passing diagonally across the sky, disappeared at an elevation of 15°, leaving a luminous trail.

Boston, Massachusetts.—Six meteors were observed within fifteen minutes on the evening of the 24th.

Meteors of less brilliancy are reported to have been seen during the month, as follows:

Yuma, Arizona, 8th, 11th.
Lead Hill, Arkansas, 16th.
Bethel, Connecticut, 7th to 11th.
Limona, Florida, 10th, 18th.
Swanwick, Illinois, 2d, 11th, 16th, 27th.
Davenport, Iowa, 2d, 3d, 5th, 6th, 7th, 10th, 23d, 24th, 31st.
Manchester, Iowa, 10th, 19th.
Fort Scott, Kansas, 2d, 5th, 8th, 29th.
Point Pleasant, Louisiana, 6th, 8th.
Woodstock, Maryland, 1st, 4th, 6th, 22d, 26th, 27th, 28th, 31st.
Charlestown, Massachusetts, 3d.
Fall River, Massachusetts, 10th, 25th, 26th.
Milton, Massachusetts, 21st.
Somerset, Massachusetts, 7th, 25th, 31st.
Provincetown, Massachusetts, 9th, 10th.
Taunton, Massachusetts, 3d, 22d.
Lansing, Michigan, 1st.
Northfield, Minnesota, 4th, 8th, 22d, 25th.
Saint Vincent, Minnesota, 25th.
Freehold, New Jersey, 3d.
Moorestown and Vineland, New Jersey, 6th.
Menand Station, (near Albany,) New York, 4th, 5th, 11th, 26th.
Brevard, North Carolina, 3d.
Erie, Pennsylvania, 26th.
Stateburg, South Carolina, 9th, 11th, 19th, 24th, 31st.
Woodstock, Vermont, 12th.
Variety Mills, Virginia, 6th, 22d, 26th.
Wytheville, Virginia, 4th.
Marion, Virginia, 1st.
Ripon, Wisconsin, 3d, 22d, 24th.

EARTHQUAKES.

Oakland, California.—Two light shocks of earthquake were felt at this place on the 4th; the first shock occurring at 11 a. m., and the second at 12.50 p. m. The course of the vibrations was from east to west.

Carson City, Nevada.—At 2.55 a. m., of the 19th, three slight shocks of earthquake were felt at this place.

London, August 14th.—A despatch from Serajevo, capital of Bosnia, announces that a shock of earthquake has been felt there. It lasted five seconds, and moved from west to east.

Washington, District of Columbia, August 23d.—Surgeon Main, at Brownsville, Texas, in a report to the Surgeon General of the Marine Hospital Service, says: "early in August there was an earthquake shock at Pachuca, Mexico, causing twenty deaths and the destruction of twenty houses.

Naples, Italy, August 22d.—Mount Vesuvius is in a state of remarkable activity. The continuous trembling of the earth has resulted in considerable injury to buildings and to the railway running up the mountain.

Saint Thomas, West Indies, September 4th.—A tidal wave occurred here on August 27th; the water receded from the shore three times. A sharp shock of earthquake was felt at 10 o'clock on the following night. On August 30th two shocks were felt almost simultaneously; the first being light but the second was severe. Considerable alarm was caused but no damage was done.

Guayaquil, Ecuador, August 30th.—A strong shock of earthquake was felt here at 8 o'clock, lasting about fifteen seconds.

Captain Luders of the bark "Pallas" which arrived at New York, September 4th, reports that, on May 21st, while in the Bay of Sunda, ashes from a volcanic eruption began falling and covered the decks to a depth of more than four inches. The ashes continued to fall until the 26th, when the vessel was from five hundred to six hundred miles from Java. During part of the time darkness prevailed day and night, compelling the use of the binnacle lamp.

Concerning the volcanic disturbances, which caused such wide-spread destruction of life and property in the Island of Java, during the latter part of August, the following notes are taken from the report published in the "New York Herald," of September 2d, 1883:

"The disturbances began on Saturday, August 25th, on the Island of Krakatoa, which is situated at the neck of the strait of Sunda, between Sumatra and Java. The deep rumblings were distinctly audible at Surakerta and Batavia, about forty-five and twenty-two miles distant, respectively. At Jogjakerta, Sourabaya, and Samarang, red hot rocks and ashes fell throughout the night of August 25th, and at Batavia there was an occasional fall of heated stones and ashes. By the following morning all communication with Anjer, a town on the strait of Sunda, was cut off, all the bridges having been destroyed by the descending rocks and ashes. The disturbance had extended beneath the waters of the strait, which were soon boiling and hissing violently, while great waves dashed upon the Javanese shores, and the temperature of the sea rose nearly 20°. The rumbling gradually became more and more distant, and by noon the largest of the volcanoes of Java was in violent eruption, which gradually spread to the other mountains, until more than one-third of the forty-five craters of Java were either in active eruption or were threatening it.

"Just before dusk a great luminous cloud formed over the Gunung Gunter (a crater of more than four miles in diameter) when it began to emit enormous streams of white acid, sulphurous mud, and smaller quantities of lava. There were rapidly succeeding explosions, followed by heavy showers of cinders and large fragments of rock, which were hurled into the air and scattered in all directions. During the evening the shocks and eruptions increased, and enormous waves began to dash with great force upon the shores, which came in some places far into the interior, and great chasms opened in the earth. About midnight a large luminous cloud, similar to that which was seen over the Gunung Gunter, but of much greater extent, formed over the Kandang range of mountains. This cloud gradually increased in size, forming a canopy of lurid red and whitish gray colors over a wide extent of territory. The eruptions now increased and streams of lava poured down the sides of the mountains into the valleys, sweeping everything before them. At about 2 o'clock Monday morning the great cloud suddenly broke into small sections and vanished. When daybreak came it was seen that an extent of territory about fifty miles square had disappeared, on which were situated several villages. None of the inhabitants of this region escaped death, the number being estimated at about 15,000.

"On Monday night the volcano of Papandayang, which is more than 7,000 feet high, was in a very active state of eruption, which was accompanied by loud detonations. Stones fell for miles around, and the black fragmentary matter, which was

carried into the air, caused total darkness. A whirlwind accompanied this eruption, which unroofed houses, blew down trees, and carried men and animals into the air. Suddenly the mountain was split into seven parts, and from the fissures poured clouds of steam. One of the most singular incidents was the sudden rising, on the forenoon of Tuesday, of fourteen new volcanic mountains in the straits of Sunda, almost on the top of what had been the Merak and Middle islands, which sank into the sea on the previous day. At the entrance of Batavia was a large group of houses extending along the shore. These were entirely swept away, and of the 25,000 Chinese inhabitants who lived on the swampy plains, not more than 5,000 escaped death. Sunda strait is much changed, and navigation in these waters is accompanied with great risk. It is estimated that on the whole island there were not less than 75,000 lives lost."

The following report was made to the superintendent of the United States Coast and Geodetic Survey by Professor George Davidson, Assistant Superintendent at San Francisco:

"San Francisco, California, August 29th, 1883. Earthquake waves commenced on Saucelito tide gauge at one o'clock on the morning of August 27th. They had increased in height, and were still exhibited yesterday. Height of waves one-foot, and time about forty minutes between crests.

"It is supposed that these waves were caused by the earthquake that destroyed Anjer and other towns in Java on August 27th. There was a similar occurrence on December 23d, 1854, when the town of Simoda, in Japan, was destroyed, and a Russian frigate in the harbor overwhelmed. The waves were recorded on the three coast survey tide gauges then used on the Pacific coast. Disturbances of like character were also recorded on these guages in August, 1868, when a succession of terrible earthquake waves broke upon the coast of Peru, destroying towns and landing a United States war vessel high and dry. The rate at which such waves move across the ocean, and also the average depth of the ocean, may be computed from such tide gauge records."

DROUGHT.

Arkansas.—Little Rock, 29th: the crops in this locality are suffering for want of rain.

Indiana.—Laconia, Harrison county, 31st: the most severe drought that has been experienced since 1874 is prevailing in this locality.

Louisiana.—Shreveport, 31st: the month of August has been exceedingly dry; owing to the prolonged drought it is considered that the cotton crop in this part of the state will not be more than half the average yield.

Maine.—Bangor, Penobscot county, 23d: the severe drought is causing injury to the crops in this locality.

Portland, 31st: drought has been prevailing in eastern New England from five to six weeks. Crops and pasturage have been seriously injured; in some instances farmers have been compelled to feed their stock with winter provender, owing to poor condition of pastures.

Massachusetts.—Somerset, Bristol county, 31st: only 0.83 inch of rain fell during the month, and a severe drought is prevailing in consequence.

Mississippi.—Vicksburg, 28th: vegetables in this locality are suffering from lack of rain.

South Carolina.—Drought in this state has been general, and the outlook for an average yield of crops is not promising. It is considered that the general average yield of corn and cotton in this state will be about three-fourths of the usual crop. Reports from several counties are given below:

Pickens, Pickens county, 30th: the condition of crops in this county is very poor; not more than half the average yield of corn and cotton will be produced.

Georgetown, Georgetown county: the crops in this county are suffering from drought, and unless soon relieved will be considerably cut off.

Yorkville, York county, 20th: drought has prevailed in the greater part of this county, but it has not been so protracted as the drought of 1881. In some parts of the county the crops are good, but they are exceptional instances; it is estimated that there will not be more than half of the usual crop of cotton, and the corn crop will be below that estimate.

Darlington, Darlington county, 29th: the crops in this county have suffered severely from the long drought. Not more than two-thirds of the average crop of cotton, and one-half of the average corn crop will be made.

Texas.—Indianola, 20th: the drought continues to prevail in this part of the state. The cotton crop is estimated to be thirty-three per cent. less than for 1882, and the corn crop is nearly a complete failure. Cisterns are low, and scarcity of water exists. In some localities cattle are dying in consequence of poor pasturage and scarcity of water.

Galveston, 17th: owing to the prolonged drought there is great scarcity of water in this city and adjacent country. Cisterns have become exhausted, and the gardens are dried up.

Virginia.—Lynchburg: the long continued drought has resulted in serious damage to the corn crop in this part of the state.

Washington Territory.—Bainbridge Island, Kilsap county: the month of August has been the dryest known in this part of the territory during the last six years.

PRAIRIE AND FOREST FIRES.

The prevalence of extensive forest fires in Oregon and Washington Territory during July, and their continuation there and in portions of Idaho and Montana during August, caused a dense smoke to spread over a large area of country. This densely smoky and hazy condition of the atmosphere prevailed during a greater part of the month, and extended over an area as far southward on the Pacific coast as Cape Mendocino, California, and thence eastward to eastern Montana, Dakota, and Minnesota.

Duluth, Minnesota, 25th.—Serious forest fires are raging in the pine lands on the opposite side of Lake Superior.

Portland, Maine, 31st.—Forest fires in adjacent country, and the atmosphere is filled with smoke.

Portland, Oregon, 31st.—Dense smoke from forest fires has continued during the entire month.

Mount Washington, New Hampshire, forest fires in northeast, 29th.

Bainbridge Island, Washington Territory, 31st.—Destructive forest fires have been raging in this territory since May 18th.

Cœur d'Alene, Idaho, 8th.
Fort Lapwai, Idaho, 4th.
Fort Maginnis, Montana, 6th, 14th, 24th, 26th, 29th.
Fort Benton, Montana, 6th.
Fort Concho, Texas, 5th, 6th, 9th.
Fort Stockton, Texas, 21st, 28th.
Coleman City, Texas, 16th, 29th, 30th.
Spokane Falls, Washington Territory, 1st.

POLAR BANDS.

Polar bands have been observed as follows:

Lead Hill, Arkansas, 1st, 4th, 6th, 7th, 8th, 10th, 15th, 22d, 24th, 27th, 31st.
Cape Mendocino, California, 25th.
Riley, Illinois, 1st.
Springfield, Illinois, 27th.
Clear Creek, Nebraska, 3d, 4th, 19th.
Vineland, New Jersey, 7th, 8th, 9th, 23d.
Charleston, South Carolina, 28th.
Woodstock, Vermont, 28th.
Wytheville, Virginia, 5th, 9th, 19th.

WATER-SPOUTS.

The s. s. "Germanic," on August 6th, at about 8 p. m., (Greenwich mean time,) in about N. 40° 47′, W. 62° 20′, passed two water-spouts of medium size about three miles north of the ship. The weather at that time was sultry; wind wsw., force 3; sky about one-fourth cloudy. They remained visible for about eighteen minutes.

Galveston, Texas.—At 9 a. m., of the 31st, an imperfectly formed water-spout was observed over Galveston bay, moving in a northwesterly direction. At 9.15 a. m. a well defined water-spout was observed in the east over the Gulf. These water-spouts were of a leaden hue, and lasted about one-half hour.

MIGRATION OF BIRDS.

Geese flying southward.—Keokuk, Iowa, 22d; Portland, Oregon, 29th; LaCrosse, Wisconsin, 30th. *Flying northward.*—Cape Mendocino, California, 26th, 27th.

Ducks flying northward.—Bangor, Maine, 29th.

ZODIACAL LIGHT.

Pensacola, Florida, 1st, 2d, 3d.
Nashville, Tennessee, 3d, 31st.
Palestine, Texas, 1st, 2d, 14th, 16th, 18th, 27th, 29th, 30th.

SAND STORMS.

Fort Yates, Dakota, 18th, 19th, 21st.

NOTES AND EXTRACTS.

An interesting report upon the climate of Palestine, by Mr. Selah Merrill, United States consul at Jerusalem, has been received at this office through the Honorable Secretaries of State and War. It is regretted that sufficient space in the MONTHLY WEATHER REVIEW cannot be spared for the publication of the full report as prepared by Mr. Merrill. For this reason, eight tables, containing interesting miscellaneous data covering a period of twenty-two years, are not published. The letter of Mr. Merrill, transmitting this report to the Department of State, was written at the United States consulate, in Jerusalem, July 11, 1883. The following extract from the report referred to will be found of interest:

Seasons in Palestine.—There are in Palestine two seasons, a rainy season and a dry one. The shortest rainy season in twenty-two years has been one hundred and twenty-six days, and the longest two hundred and twenty-one days, while the mean duration of each has been one hundred and eighty-eight days. On the other hand, the shortest dry season for the same period was one hundred and thirty-four days and the longest two hundred and eleven days, while the mean duration of each was one hundred and seventy-seven days.

Commencement of the rain.—The time of the commencement of the rain is uncertain, and varies many weeks between the two extremes. In September the people of the country begin to talk about rain and to look for the tokens of it, but rain very seldom falls during that month, and further, that in eleven of the twenty-two years under consideration, no rain fell even in October. When rain does not fall until the middle or the last of November great anxiety and distress are caused by the delay. In four of the twenty-two years there was a slight fall of rain in September, but rain during this month is to be considered as exceptional.

The "early," "middle," and "latter" rains.—Every one is familiar with the terms, the "early" and the "latter" rains, which refer to parts of the rainy season. The rainy season, however, is really divided into three parts, and it is during the middle one of these periods that the most rain falls. It is very seldom that many days of rainy weather occur in succession, but whether the rainy periods are of one or of several days duration, they are sure to be followed by one or many days of fine weather, and these fine days of the winter and early spring months are some of the most enjoyable that the climate of Palestine affords. The "early" rains are depended upon to moisten the earth and fit it for the reception of seed, and hence it is a general signal for the commencement of plowing. The middle or heavy winter rains furnish the real water supply of the year. The earth is then saturated, springs are replenished, and cisterns are filled with water. The "latter" rain, which falls in gentle showers, is indispensable to the perfection of the grain. However copious may have been the winter rains, unless the "latter" rain falls, the harvest is wholly or in part a failure. Hence, this is looked for by the farmers especially, and by all the people of the land as well, with peculiar anxiety.

Connection of wind with rain.—Most of the rain storms come from a westerly direction. Of those noted during the period of twenty-two years, forty-nine were from the northwest; one hundred and fifty-six were from the west; and two hundred and thirty-eight were from the southwest. On one hundred and forty-nine occasions, however, an easterly wind immediately preceded the change which ushered in the rain. Not infrequently the direction of the wind changes during the storm; if it passes to the north the rain ceases; while a change from any quarter to the southwest usually indicates a continuance of the rain.

Temperature during rainfall.—On three hundred and sixty-nine occasions the temperature of the air became lower as the rain fell; on ninety occasions it rose slightly; and on forty-seven occasions it remained stationary, or nearly so, until the rain ceased.

Snow.—During twenty-two years eight seasons have passed without snow, against fourteen seasons, when snow has fallen. In general, snow falls in small quantities and soon melts, but occasionally there is a heavy fall, that, for instance, for the 28th and 29th of December, 1879, which was extremely heavy, measuring seventeen inches on a level.

Earthquakes.—Most of the earthquakes that have been noted occurred during the rainy seasons. Eight occurred during actual storms, and four of these occurred during snow storms. It is interesting to observe further that, in nearly every instance, they had been preceded or were followed by an easterly wind.

Barometer.—Jerusalem is 2,600 feet above the level of the Mediterranean, and the mean height of the barometer during twenty-one years has been 27.398 inches. The highest reading during this period was 27.816 inches on the 31st of December, 1879; the lowest was 26.972 inches on the 22d of April, 1863, and on the 3d of February, 1865; so that the extreme range has been 0.626 inch.

Cold, heat, and frost.—The coldest month in Jerusalem is February, in which month the mean temperature during the last twenty-two years has been 47°.9 (Fahr.) It rises, month by month, until August, when the mean temperature has been 76°.1 (Fahr.), and then sinks again, month by month, until the following February. The mean annual temperature during this period was 62°.8 (Fahr.). The hottest days of the year do not occur, however, in August, but usually in the months of May, June, and September. The lowest temperature registered by the thermometer during this period was 25° (Fahr.), which was on the 20th of January, 1864. In February and October, also, and once in April, a minimum of 32° and 30° has been noted. These cases are, however, notably exceptional.

In Jerusalem frost occurs on five or six nights in the course of a winter, but ice is rarely ever formed.

Winds.—A peculiar feature of the climate of Palestine is its strong winds. The physical conformation of the country has doubtless something to do with this. There is a ridge of rugged mountains running north and south which drops to a broad maritime plain on the west, and on the east to a deep chasm, sunk into the earth to a depth of 1,300 feet below the level of the Mediterranean, beyond which chasm (which is the Jordan valley) another ridge of mountains rises abruptly to a height equal to, or greater than, that of the western ridge, and beyond this, in turn, a vast table land stretches eastward to the Euphrates and southward to Arabia.

Both the inhabitants of the country and its crops are largely affected by the prevailing winds. The north wind is cold; the south warm; the east dry; and the west is moist. North and northwesterly winds prevail most in the summer months, when they are cool and refreshing, moderately dry and accompanied by few or no clouds. The north winds of winter are cold and sharp. Their coolness and sharpness, even in summer, are apt to produce sore throat, fever, and dysentery. Without the strong westerly winds of summer the climate of Jerusalem would be unbearable. Occasionally these winds do not blow for several days in succession, and at such times the heat becomes very great. As a rule this strong westerly breeze comes up every afternoon. It is felt at Jaffa, and at other places on the coast, as early as 9 or 10 a. m., but it does not reach Jerusalem until 2 to 4 p. m. Generally it subsides about sunset, but rises again later in the evening and sometimes continues through a great part of the night. Consequently, however hot the day may have been in Jerusalem, the nights during the summer season are almost always cool. Thus this wind, although often strong, disagreeable, and filling the air with clouds of dust, is a great blessing to the inhabitants; but at the same time it makes it very necessary for them to take precautions to protect themselves from its influence at night. Easterly winds are rare in summer, while they are common in each of the other seasons. The average for sixteen years has been three days of easterly winds for each month from June to September, and eleven days for each month from October to May, inclusive.

East wind and sirocco.—The east wind in winter is usually accompanied by a clear blue sky, and is dry, stimulating, and, if not too strong, is very agreeable. In the warmer months it is unpleasant and depressing from its great heat and dryness, and the haze and dust which ocassionally accompany it. The southeast winds are those which are popularly termed siroccos, and which are most disagreeable. "The worst kind of sirocco," says Dr. Chaplin, "dries the mucous membrane of the air passages producing a kind of inflammation resulting in catarrh and sore throat; it induces great lassitude, incapacitating for mental as well as bodily exertion, in those who work in it; headache, with a sense of constriction as if a cord were tied around the temples, oppression of the chest, burning of the palms of the hands and soles of the feet, accelerated pulse, thirst and sometimes actual fever. It dries and cracks furniture, loosening the joints of tables and chairs, curls the covers of books and pictures hung in frames, parches vegetation, and sometimes withers whole fields of young grain. Its force is not usually great, but sometimes severe storms of wind and fine dust are experienced, the hot air burning like a blast from an oven, and the sand cutting the face of the traveller who has the misfortune to encounter it. This kind of air has a peculiar smell, not unlike that of the neighborhood of a burning brick kiln. Sometimes the most remarkable whirlwinds are produced, especially in the western plain near the hills, by the meeting of a strong east or southeast wind with a wind from the west or north. Clouds of sand fly about in all directions, now taking the traveller in front, now behind, and now on the side, and the gusts of wind are so violent as to blow weak persons from their horses, and to overturn baggage animals. The cold sirocco of winter often blows with much force, and when it comes from a few degrees north of east it is so cold and

piercing as sometimes to kill those who are exposed to it without sufficient clothing, instances of which occurred in the year of 1867."

It is an old and popular saying with the people in the country that a sirocco always lasts three days, but they have been known to last for twenty and even thirty days.

Clouds.—A noticeable feature of Palestine is its cloudless skies. There has been an average of one hundred and forty days in each year for sixteen years which were cloudless at 9 a. m. Still, during a large part of the year, clouds are present, and they affect the climate in various ways, but chiefly by moistening the atmosphere and by producing a shade which moderates the otherwise intense heat of the sun. The smallest amount of cloud during the year is in the months of July and August.

Dew.—During the winter months dew forms in Palestine in the ordinary way, and hence needs no special notice; but in the summer months, when the whole country is arid and there is no water to evaporate, the copious dews are brought entirely by the westerly winds from the sea. If no westerly breeze, or but a very light one, springs up towards the evening, there is no dew. The heavy dews of summer, which modify the climate so remarkably, differ from the ordinary dew in the manner of the deposition, being in great part precipitated in the air in the form of mist before being deposited on the earth. On summer evenings a few clouds are commonly to be seen in the western horizon soon after sunset. Later in the evening they increase in number, becoming lower and looser, and sweep past at no great elevation and often with considerable velocity. Towards midnight, or later, they become still more abundant and still lower, brushing the tops of the hills as they pass, and depositing much of their moisture upon them. Although dew may form even in summer in the usual way on clear nights, the surest sign of a copious deposition is the appearance of clouds, with a westerly wind, after sunset. Dew is most copious in the spring and in September and October, except during sirocco weather, when there is none. Clouds and a westerly wind at sunset and afterwards are not, however, always indications of a very damp night. It is the continuance of the westerly wind during the night that brings abundance of dew. Often at daybreak the sky is obscured by a heavy mist and the ground is wet as if rain had fallen. When the sun begins to act upon this mist, large masses of white cloud are formed, which, however, soon disappear before the great heat, leaving overhead only the usual blue sky of summer.

Unhealthy period of the year.—The unhealthy period of the year, the period in which the climatic diseases of the country, such as ophthalmia, fevers, and dysentery, are most prevalent, extends from May to October, inclusive. Six things strongly characterize this period:

1. Almost entire absence of rain.
2. Low atmospheric pressure with small range.
3. High temperature with great daily range.
4. Great dryness of the atmosphere.
5. A very small amount of cloud.
6. At the beginning of this period, a minimum of easterly winds.

While I have been completing this report the cholera has broken out in Egypt, and a strict quarantine has been established in all the Syrian ports. In this connection, therefore, it may be of interest to add a note respecting the climate of Jerusalem in October, 1865, when the cholera raged in this city with considerable violence. The period from the 7th to the 24th of that month was one of great and oppressive heat. During the whole eighteen days the sky was cloudless but overspread with a thin haze; the wind was from the northwest, north and east, but was so light as to be considered a calm, except on the 15th and 16th, when there was a light breeze from the east. The highest temperature was 94° (Fahr.), and on eleven days it rose to at least 90° (Fahr.). During the period the mean of the maximum temperatures was 89°.1 (Fahr.), and the mean of the minimum temperatures was 65° 8 (Fahr.), the mean temperature for the period being 77°.4 (Fahr.). This high temperature, together with the calm, close, hazy atmosphere, was supposed to have some influence in spreading the cholera.

Dr. Gustavus Hinrichs, Director of the "Iowa Weather Service," has forwarded the following advance proof of the August report of that service:

August, 1883, was cold, clear, and dry, with northwesterly and southeasterly winds equally frequent, and calms numerous.

The mean temperature of the air was nearly two and a half degrees below normal. During the last thirteen years August has only once been colder, namely, in 1875; but in the thirty years preceding 1870, August was as cold four times in every ten years.

The low mean temperature of the month is mainly due to the first decade, which was six degrees below normal; but during this decade the sunshine was remarkably intense, the insolation thermometer averaging 141 degrees. The two last decades of the month were almost normal in temperature, while insolation was less than during the first decade.

The rainfall was low, except for northwestern Iowa, where a slight excess of rain fell. The frequency of rain was also low; almost the entire Mississippi slope had but one notable rain, which occurred on the 8th, from the Iowa to the Maquoketa valleys, on the 11th in Central Iowa, on the 14th in middle southern Iowa, and on the 27th in the northeast of the state. The number of thunder-storms has been very low.

No tornadoes nor extended storms have occurred in Iowa during August, but a remarkably severe hail storm cut a narrow swath on the 7th, from Sac to Cass counties, and some hail fell near Keosauqua on the 19th.

The number of fine days has been remarkably high, admirable for the threshing of small grain. The dry sunny weather has also favored the ripening of that corn, the seed of which was brought from a dryer or a considerably warmer state (Nebraska and Kansas).

This year's summer, that is the months of June, July, and August, averaged cool; while warmer than last year's summer, it was colder than that of 1877, but yet very much warmer than that of 1875, which was the coldest during the last twenty years. The rainfall has, for most parts of Iowa, been very favorably distributed, and the sky has been fair, especially during the latter half of summer. No serious tornado has visited Iowa this year during the rising season, and the chances of such storms during the falling season are much less.

The following extract is reprinted from the report of the Ohio Meteorological Bureau for August, 1883:

The average barometric pressure throughout the state was greater than for several months preceding, the mean being 30.066 inches. The barometer was unusually steady, the range being .542 inches, which is less than that for any month hitherto reported upon by this bureau. The maximum was 30.320 inches, observed at Oberlin, and the minimum was 29.778 observed at Cleveland.

The mean temperature was 68°.2, being about four degrees less than that for July, and somewhat more than four degrees lower than the normal mean for August. A maximum temperature of 98° was observed on the 22d at Waverly, Pike county, this being only .2 of a degree higher than the maximum for July.

The lowest temperature observed was 39° on the 30th, at Sidney, Shelby county. The greatest range for the whole state was, therefore, 59°, but the maximum range at one point was 48° on the 17th, at Waverly, and the minimum was 5° on the 29th, at Wooster. The mean daily range for the whole state was 22°.7.

The most remarkable feature of the weather for the month was the unusually small amount of precipitation. The mean rainfall was only 1.88 inches, which is less than any previously recorded, and barely half of the normal amount for August, which is 3.47 inches. It will be observed that, on an average, there were thirteen clear days, thirteen fair days, and four cloudy days; and that rain fell on seven days. The maximum rainfall was, at Lebanon, 4.60 inches, which is considerably above the normal amount, and the minimum was .70 inch, at Granville.

A storm of hail and wind of considerable violence visited Wooster and vicinity on the 28th. Some houses in process of erection were moved from their foundations, and many trees were blown down.

Professor W. C. Latta, Director of the "Indiana Weather Service," has forwarded the following meteorological summary for August, 1883:

LAFAYETTE, IND., *September 9th*, 1883.

The month of August, just past, has been remarkable for the uniform lowness of temperature and the small precipitations, the latter falling far below the monthly average for twelve years.

No storms of special importance have occurred, excepting, perhaps, the large amount of thunder and lightning which accompanied almost all the storms throughout the state.

Barometer.—The barometer at this station remained almost stationary during the greater part of the month. Mean, 30.131; maximum, 30.430; minimum, 29.720; the range being only .710.

Temperature.—The lowness of the temperature at this station is a fair average for that of the state. Mean, 68°.3; maximum, 89°, on the 22d; minimum, 55°, on the 30th. The greatest range in any one day occurred on the 31st. The range being 24°, falling from 80° at noon to 56° at 9 p. m.

Precipitations.—The precipitations reported have been uniformly small, far below the average for several years, except in Henry, Miami, and Rush counties, where the amounts were 6.35, 4.33 and 4.65 inches, respectively. But even this local variation will make the monthly average fall at least 1.00 inch below the monthly average for twelve years past.

Sun spots have been noticed quite frequently throughout the state, but the spots have been quite small in comparison with those seen in July.

Respectfully submitted,

PROF. W. C. LATTA.

REPORT OF THE MISSOURI WEATHER SERVICE, AUGUST, 1883.

The mean temperature during the month has been generally below the normal for August. At the central station it was 74.4, which is 2.3 degrees below Dr. Engelmann's normal for Saint Louis. In only seven instances, *i. e.*, in 1842, '49, '52, '55, '56, '66, and '75, has it gone below that of the past month since 1837, inclusive. In one instance, at Greenfield, the mean temperature for August was reported above that of the previous month. The highest mean reported was at Glasgow, in the central part of the state.

The maximum temperatures have been, almost all over the state, below the average maximum for August. In three instances, at Mascoutah and Cairo in Illinois, and at Chamois, higher maximum temperatures were reported than for the month preceding. Warrenton reported the highest maximum.

The lower minimum temperatures were generally observed towards the latter part of the month. The lowest were on the 24th and at some few places on the 23d.

The rainfall at the central station was not much more than one-half of the normal amount for August. Taking the mean of the two Saint Louis sta-

tions heard from, there was a rainfall which is 0.96 below the normal for Saint Louis. There has been a general scarcity of rain throughout the state, the crops suffering very much from the continued drought. The heaviest rainfall was along the southern border of the state. Through the central part of the state, extending from the northwestern to the southeastern border, it has been very light. At Oregon the amount was 2.72 inches below a normal for that place taken from a series of observations extending through twenty-nine years.

Hail was reported at Lexington on the 16th and at Carthage on the 23d.

Cairo reports severe wind storms on the 10th and 23d.

A. RAMEL, *Assistant in charge.*

Washington University, September 9, 1883.

Abstract of meteorological observations for the month of August, 1883, as reported to the Bureau of Agriculture, &c., of Tennessee, by voluntary observers in co-operation with General W. B. Hazen, Chief Signal Officer, U. S. A.

County.	Station.	Latitude north.	Longitude west of Washington.	Temperature.							Wind.			Number of days—											Total rainfall, including hail, snow, and sleet (in inches).	Observers.
				Mean of 7 a. m.	Mean of 2 p. m.	Mean of 9 p. m.	Average monthly.	Highest.	Date.	Lowest.	Date.	Prevailing direction.	Greatest force. Scale 0 10.	Date.	Clear.	Fair.	Cloudy.	Auroras.	Dew.	Fog	Frost.	Lunar halos.	Solar halos.	Hail storms.	Thunder storms.	On which rain fell, including hail, snow, and sleet.		
		° ′	° ′	°	°	°	°	°		°																		
Anderson	Andersonville	36 15	6 58	64	81	70	71	94	21	50	30				17	6	8			13						4	1.88	J. K. P. Wallace, 3od.
Bedford	Flat Creek	35 30	9 40	70	81	69	72	89	22	48	31	nw.	br.	28	12	9	10								9	9	3.36	William Hart.
Blount	Maryville, 960 ft.	35 45	7 00	68	83	60	70	92	22	58	30	w.	br.	24	8	11	12			5						6	3.77	W. H. Henry.
Campbell	Caryville	36 00	7 30	65		65	60	88	19	52	31	se.	br.	14	13	9	9			5						8	2.65	Fletcher Smith.
Carroll	Huntingdon	36 00	11 20	70	85	74	78	89	22	60	31	n.	br.	23	13	13	5		24	4					1	6	2.33	A. W. Hawkins.
Carroll	McKenzie, 515 ft.	36 10	11 30	72	85	77	78	93	1	64	25	n.	l. 3.	15	21	10			20	4					3	6	1.93	John Brown.
Cheatham	Kingston Springs	36 10	10 04	68	83	76	76	91	22	52	31	n.	br.	28	20	6	5									4	5.29	W. J. Inman.
Coffee	Manchester	35 20	9 04	66	81	69	71	90	22	55	31	n.	br.		10	11	10		3	3					2	6	6.38	Wiley Hickerson.
Coffee	Beech Grove, 1,050 ft	35 30	9 06	62	82	70	71	89	19	49	31	e.			17	4	10								4	7	4.42	B. F. Cheatham.
Cumberland	Grassy Cove	36 00	8 00	66	75	63	67	89	15	43	30	s.	br.	27	15	9	7					2				9	4.78	Nettie M. Stratton.
Crockett	Gadsden	35 45	12 00	70	81	74	75	91	22	61	31	w.			18	8	5									4	3.86	M. T. Moore.
Davidson	Nashville	36 10	9 44				74	92	19	55	31	ne.	br.	21	14	14	3		24	11		1	1		7	10	4.39	L. N. Jesunofsky.
DeKalb	Smithville (near)	35 00	8 40	68	81	72	73	86	22	59	30	s.	br.4.	1	10	11	10									5	3.80	P. C. Bluhm.
Dyer	Dyersburg	36 15	12 20	69	82	71	73	93	20	58	31	n.	br.	6	13	10	8								2	6	4.00	L. Hughes.
Franklin	Sewanee, 2,100 ft.	35 12	8 50	68	76	67	69	84	20	61	4	se.			15	4	12									14	3.22	H. Easter.
Gibson	Trenton, 450 feet	36 00	11 58	67	80	71	73	88	21	59	26	ne.	h. 7.	15	16	10	5		27	8					2	5	4.57	A. S. Currey.
Gibson	Milan, 440 ft.	35 55	11 46	66	83	71	73	93	22	52	31	ne.	br.	15	19	4	8							1	4	5	4.26	M. D. L. Jordan, M. D.
Hawkins	Rogersville	36 22	5 57	67	81	67	71	90	22	61	3	w.			5	5	12		28	1						8	1.61	Thos. F. Walker.
Hardeman	Bolivar	35 18	12 00	69	83	73	74	91	22	60	31	n.			22	5	4			2					2	5	2.42	E. P. McNeal.
Hardin	Savannah	35 20	11 40	66	84	69	72	91	22	55	31	n.	br.4.	24	21	6	4			4		3	1			2	2.03	H. R. Hinkle.
Haywood	Brownsville	35 36	12 20				76	98	23	54	31	n.			24		7									3	1.03	Daniel Bond.
Henry	Paris	36 33	11 25	69	74		71	88	21	64	29	w.	br.5.	22	13	13	5									3	2.00	J. J. Travis.
Humphreys	Waverly	36 00	10 40	64	80	76	74	90	22	50	31	ne.			8	14	9								4	6	3.07	D. R. Owen.
Lincoln	Howell	35 15	9 30	68	84	70	74	92	13	56	31	n.	br.	15	4	16	11			12					1	14	3.27	O. R. Hatcher, M. D.
Marion	Fostoria, 1,200 ft.	35 10	8 50	59	78	66	67	90	20	45	30	s.			18	3	10								4	4		Charles Foster.
Maury	Hardison's Mills	36 00	10 60	61	77	71	70	90	21	55	30	n.	br.3.		5	10	10					4			2	8	4.74	Calvin Hardison.
McNairy	McNairy Station	35 00	12 00	69	87	71	74	92	22	60	31	n.	l.		15	12	4									5	1.05	J. H. Blakely.
Montgomery	Sailor's Rest	36 24	10 35									e.			9	14	8								4	4	1.25	John Minor.
Overton	Livingston, 966 ft.	36 23	8 17	67	81	66	70	90	14	54	30	sw.	br.		8	10	13								9	7	4.42	J. A. Laughlin.
Rutherford	Florence Station	35 53	9 26	70	85	71	74	94	23	63	30	e.	br.		16	9	6			3						8	4.80	C. F. Vandeford.
Rhea	Grand View, 1,635 ft	35 45	7 48	65	75	64	67	85	23	44	30	sw.	br.4.	28	14	9	8		22	10			2		3	9	2.04	Hattie R. Stratton.
Smith	Riddleton, 548 feet	36 19	9 07	67	80	70	72	89	21	54	31	n.	br.		7	19	5						1			4	6.28	S. P. Fergusson.
Smith	Alexandria (near)	35 30	8 56	73		73	73	82	21	65	17	n.			3	20	8			3						5	4.23	Irenus Beckwith.
Williamson	Franklin	35 50	9 48	65	80	71	72	87	20	54	31	n.	br.	29	11	8	12									7	4.51	Samuel Henderson.
Warren	McMinnville	35 45	8 45	70	80	71	73	90	19	60	31	n.	br.	29	12	9	10			1					4	7	2.99	R. M. Reams.

Chart I. Tracks of Low Barometer Areas. August 1884.

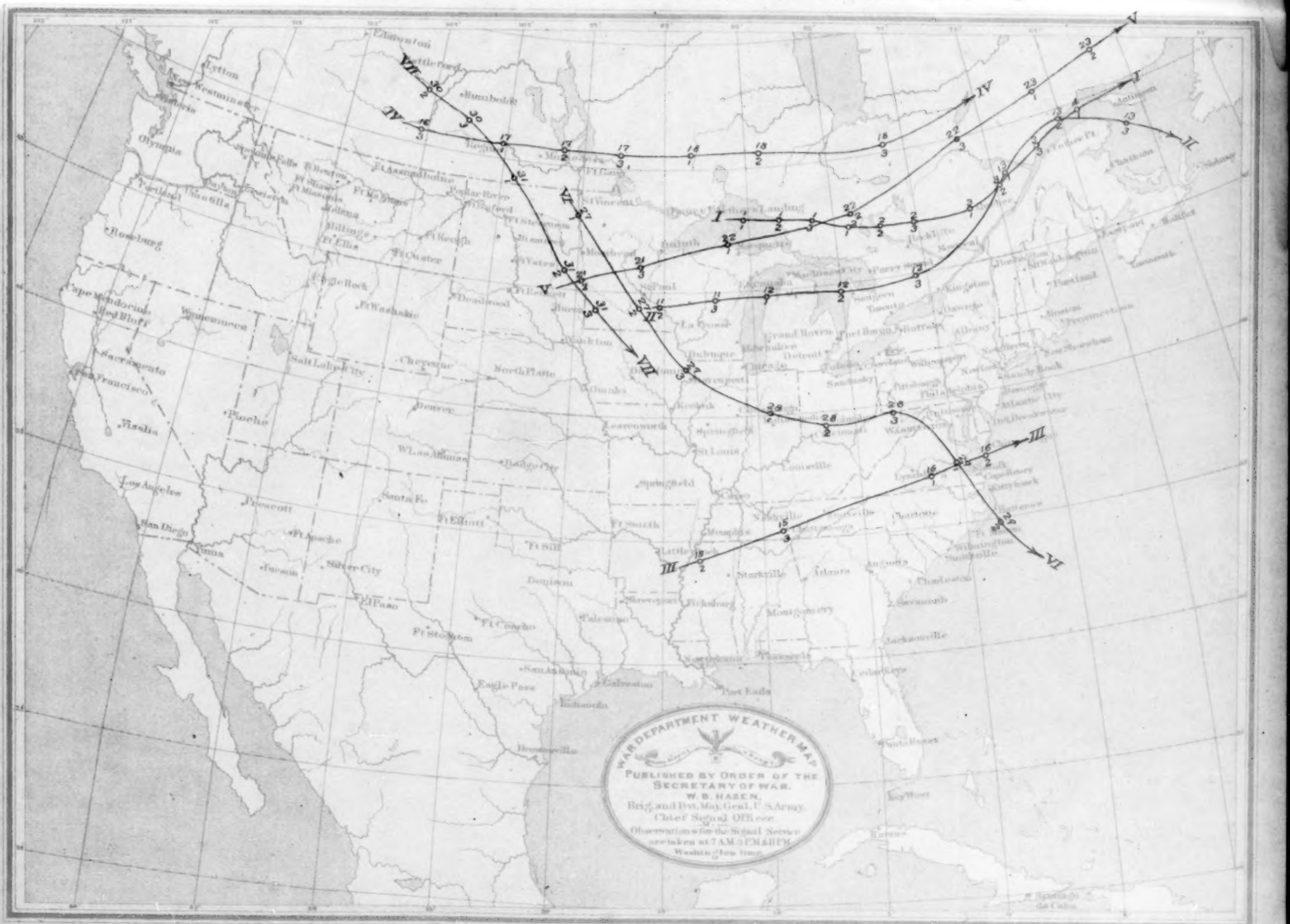


Chart II. Ocean Storm Tracks. August, 1883.

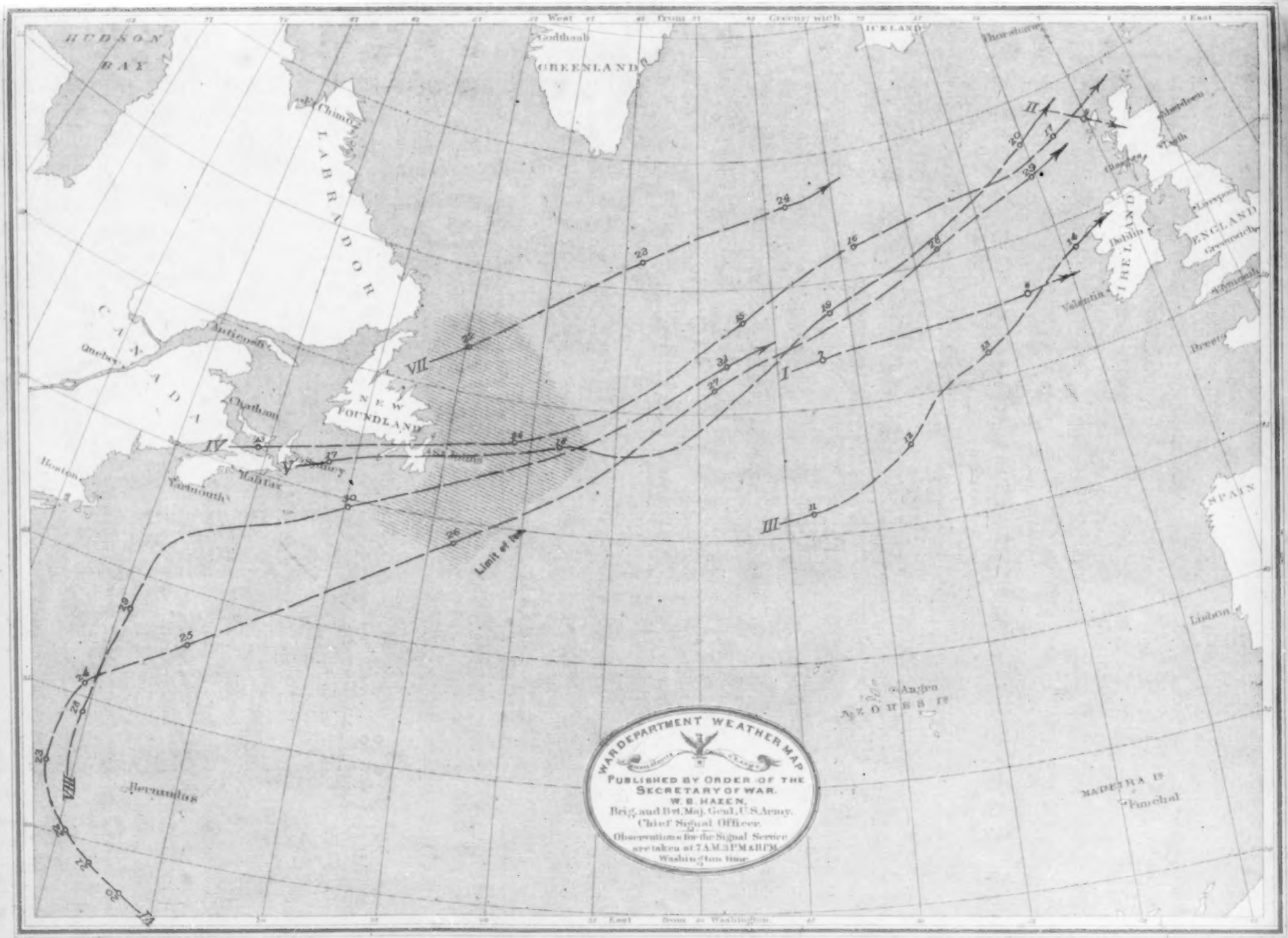


Chart III. Isobars, Isotherms, and Winds. August, 1883.

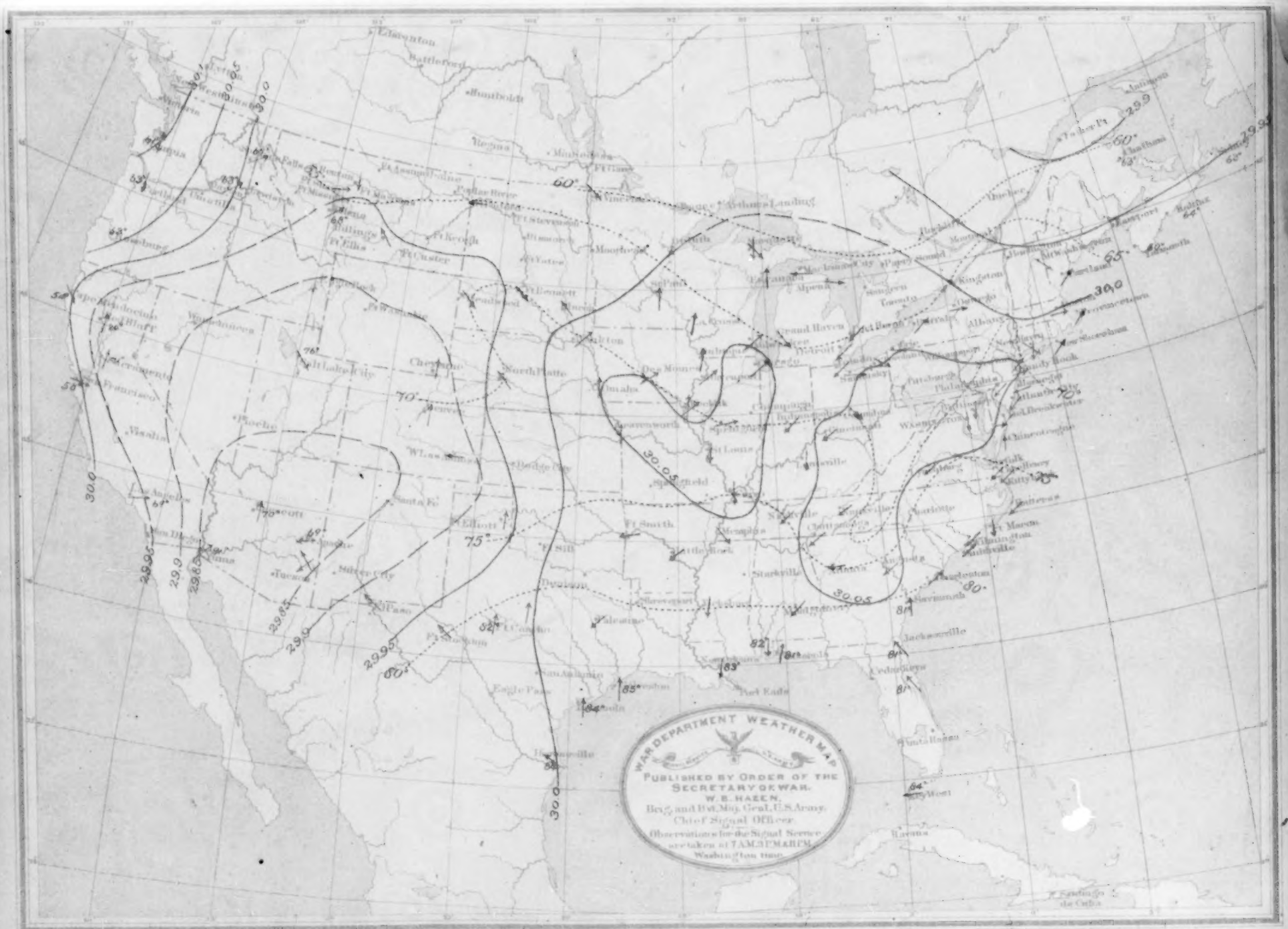
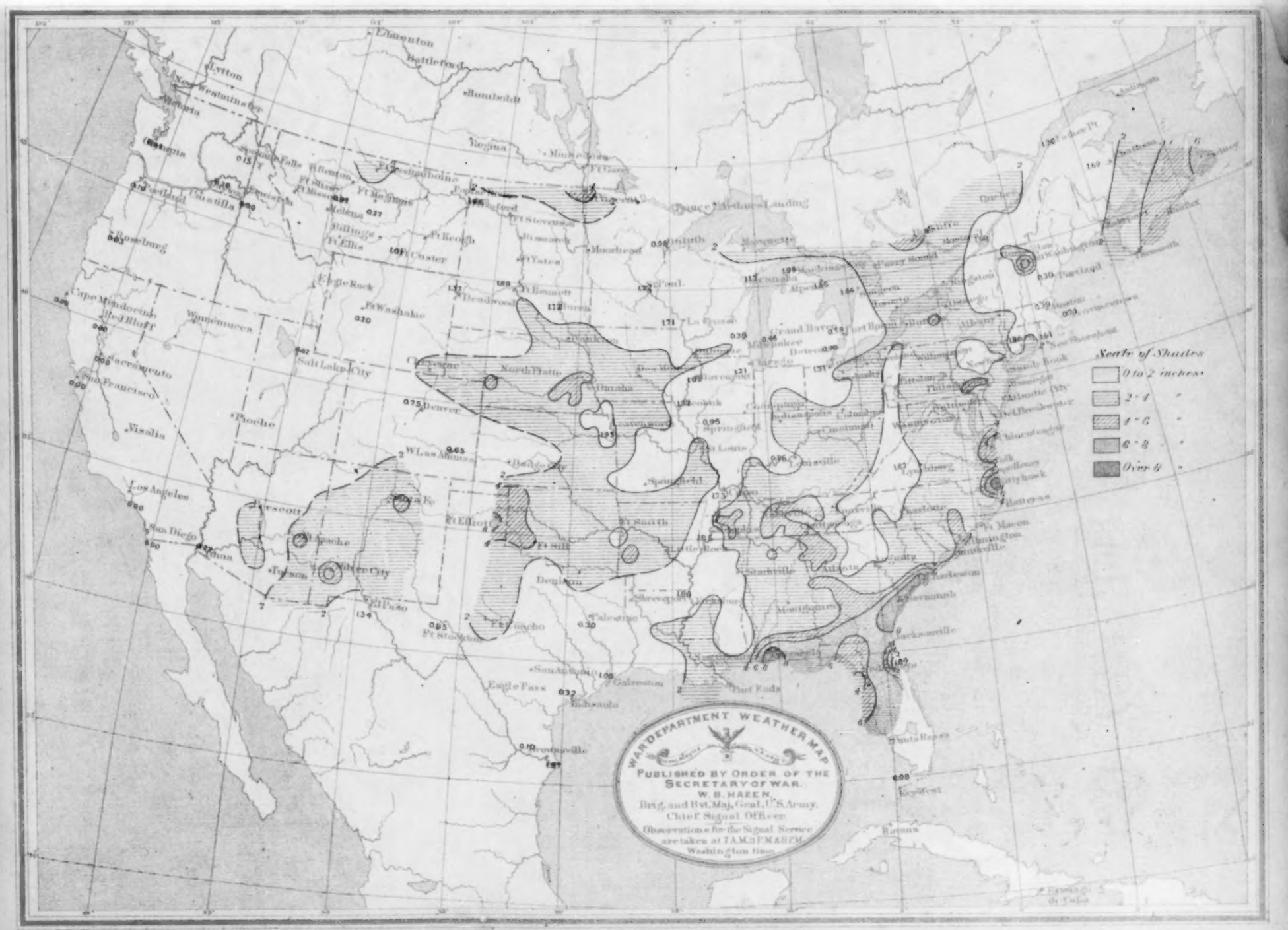

WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
W. B. HAZEN,
Brig. and Bvt. Maj. Gen'l, U.S. Army,
Chief Signal Officer.
Observations for the Signal Service are taken at 7 A.M. 3 P.M. & 11 P.M.
Washington time.

Chart IV. Precipitation, August, 1883.


Scale of Shades
0 to 2 inches
2 - 4 "
4 - 6 "
6 - 8 "
Over 6 "
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